Multipurpose plants for fine and specialty chemicals production

Business Based Maintenance at DuPont

Simatic PCS 7 Version 6
Migration at BASF
In fine and specialty chemicals production, flexibility is an important issue. The modular structure of multipurpose plants facilitates implementing new process strategies.

Continuous innovation is the driving force behind BASF’s ongoing success. This is also true for process control: in Ludwigshafen, BASF implemented the new Simatic PCS 7 Version 6.0.

14,000 devices from multiple vendors and only one uniform control solution – the Madero Refinery in Mexico solved this integration task using Simatic PDM.

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Cover: Water on wood proofed with “Lotus Spray”, courtesy of BASF
Dear Readers,

Petrochemicals, base chemicals, fine and specialty chemicals – it is sometimes difficult to differentiate the various processes and products as well as to define the common characteristics of the diverse companies that make up the chemical industry. Nevertheless, there are tasks and challenges that are typical for all companies in the chemical process industry.

The first challenge is that more and more products and chemicals are becoming commodities – a trend that has long been part of the production routine in petrochemicals and base chemicals and is also encroaching increasingly on fine and specialty chemicals as the market globalizes. Fine and specialty chemical manufacturers are responding to this development both by redirecting their product ranges and by pursuing new service- and knowledge-intensive business models. In pursuit of these aims, manufacturers involve business partners that provide innovative solutions as well as additional capabilities to help enable the cost-effective adaptation of existing processes and plants to meet the new challenges. Multipurpose plant concepts are one approach to flexible production that is well prepared for future new product specifications and product changes. But these new strategies and concepts also demand new ways of interaction between process and automation technology, through all project phases. They demand that automation technology suppliers provide a corresponding range of products, systems, and solutions tailor-made for specific industry segments.

Siemens has developed innovative products and systems as well as flexible, modular concepts integrated into a range of solutions designed to meet industry requirements. These solutions support customers in responding flexibly to new demands and implementing the necessary process adaptations at a minimum cost. Our products and services for horizontal and vertical data integration make our customers’ business processes transparent. With this complete range of products and services, we help our customers get fit for competition.

In this issue of Process News, we present a few examples of ways to save both time and money with new plant ideas, open and flexible automation or IT solutions, and new service concepts, along with ways to make processes safe for the future – in all segments of the chemical process industry.

Kind regards,

Dr. Hermann Kremer
Head of Industry Segment Development
Chemical Processing Industries
Acquisition of Flow Division of Danfoss Successful

Siemens has completed the acquisition of the Flow Division of Danfoss as of September 1, 2003. A corresponding agreement had already been signed in May 2003. The acquisition comprises two production sites in Nordborg, Denmark, and in Stonehouse, UK as well as the worldwide sales organization for electronic flow measurement devices. With this move, Siemens continues to strengthen its market position in the important sector of process automation. Flow measurement devices are a key element for process automation. They are used in industrial sectors such as food and beverages, chemicals/pharmaceuticals and water/waste water, and represent approximately a quarter of the current measuring technology requirements for production processes. With this acquisition, Siemens A&D is complementing its product and technology portfolio and improving its market access to important customers, especially in Europe and Asia. The flow activities of Siemens and Danfoss will be combined in the new A&D business unit called Siemens Flow Instruments and headquartered in Nordborg.

Cooperation in the Cement Industry

The Danish company FLSmidth A/S is the global leader in erecting cement works. The factories are equipped with automation technology from FLSmidth Automation, which has recently been working closely with Siemens.

In the summer of 2003, FLSmidth Automation signed a contract to participate in the joint marketing of the Cemat control system. Siemens developed Cemat to meet the specific requirements of the cement industry. Previously, FLSmidth had been using its own control system exclusively.

Under the terms of the agreement, Siemens will also immediately take responsibility for providing training at end customers’ facilities and will support FLSmidth in the acquisition of new projects.

The joint efforts have already yielded their first fruits: two new projects, one in Iran and one at Gulf Cement are currently being implemented with Cemat.

Integrated building automation systems generate savings during the entire life cycle of the building, from engineering through spare parts warehousing through maintenance and repair. Further savings are possible when production utilities are integrated into the comprehensive solution. This further reduces the number of interfaces and allows a common HMI for integrated MES solutions.

HVAC (heating, ventilation, and air-conditioning) is one of the most important subunits in production, both in terms of production conditions and consistently high product quality. The horizontal and vertical integration of the automation solution for production and subunits guarantees the optimum availability, high efficiency, and cost-effectiveness of the whole plant.

Simatic HVAC Automation is an integrated HVAC automation solution for a variety of industries, based on Simatic standard products. Using software libraries for medium to large HVAC applications, reference plants have already been implemented successfully in various industries.

The HVAC Lite library for small standalone applications is new. It is suitable for the automation of warehouse and factory ventilators and small ventilation and air-conditioning systems.

Find out more:
www.siemens.com/simatic/hvac
E-Mail: leopold.streit@siemens.com

Find out more:
www.siemens.com/flow
E-Mail: leopold.streit@siemens.com

Find out more:
www.siemens.com/cement
E-Mail: klaus-dieter.schreiter@siemens.com

Find out more:
www.siemens.com/flow
E-Mail: leopold.streit@siemens.com
Focused Troubleshooting and Minimum Failure Times with the New Simatic S7 TIA Training

Because there are no longer clearly defined training courses for many industrial activities, the requirements for basic and advanced training for routine industrial work are continually increasing. With training, the features and benefits of the individual products and systems can be better exploited. Exact knowledge of the procedures for optimum use enables faster and more effective operation and saves time and money.

The Sitrain training program therefore now includes a new service training course with an emphasis on Totally Integrated Automation (TIA). Blended Learning, which combines a variety of learning approaches and sequences, is used for the new TIA service training. The customer learns how best to look after his or her plant, diagnose and remedy faults quickly, and execute programming rapidly and reliably.

The central component of the Blended Learning concept is still participation in a course held at one of the regional training centers. Course attendance is augmented by time- and place-independent online learning, which allows the participant to study the course contents in a personal learning environment on the Internet or review the subject before or after the live course. The participant can test his or her knowledge in advance with a free online test to ensure that he or she registers for the right course. If needed, the participant can brush up on theoretical knowledge online at home prior to the actual live course, in order to achieve optimum learning.

More Than 50 Analysis Systems for Korean Cement Industry

Based on a new emissions-control decree enacted by the Korean Ministry of the Environment, 500 industrial combustion plants will have to be gradually integrated into the environmental authorities’ monitoring system by the year 2005. The goal is to be able to run plausibility checks on the measurements without environmental inspectors needing to be on site. The plants affected by the decree include cement production facilities that have been equipped with emission monitoring systems by the Doosan company in Seoul.

A total of 54 identical analysis systems had to be built for this project. Siemens initially supplied Doosan with four systems with Ultramat 23 gas analyzers, which were then rigorously tested and compared with competitive products. After extensive comparisons, Doosan decided to order the other 50 systems from Siemens. It was not only the excellent price/performance ratio but also the good local support in Korea that won Siemens the business.

The systems have been delivered and are working to the customer’s total satisfaction – and, thanks to a special manipulation-safe sampling probe, the cement works operate within legal margins at all times.

Find out more:
www.siemens.com/sitrain
E-Mail: anjaschmidt@siemens.com

Find out more:
www.siemens.com/processanalytics
E-Mail: alexander.scholl@siemens.com
Multipurpose plants in fine and specialty chemicals

Flexibility Increases Profitability

What trends are emerging in the chemicals industry? What are the top strategies for meeting future challenges? What type of plant provides the right solution? Many companies today have such questions on the agenda. The international chemicals market is undergoing a period of change. Two parallel developments can be observed in fine and specialty chemicals: On the one hand, more and more products are becoming commodities; on the other hand, there is increasing demand for innovative products tailor-made for specific customer requirements and equipped with the appropriate functions.

An ever-increasing fraction of fine and specialty chemicals becomes commodity products. This has led to fiercer competition in this sector, increasing the emphasis on cost reduction. However, more and more companies are relying on innovative and therefore more service- and knowledge-intensive products. The manufacture of such innovative products demands flexible and versatile plants.

This dual market development is reflected in plant structures. Dedicated-batch or semi-batch plants are used for standard products. This type of plant is characterized by production lines that are specifically designed for their respective products and are usually fully automated. Manufacturing many different products in small batch sizes is usually not possible in these plants. So-called multipurpose or flexible batch plants are being developed and implemented to serve this purpose. Unlike dedicated-batch plants, the equipment in multipurpose plants is of a largely universal design and can be combined in different ways to meet different needs – for example, by mobile containers and preparation drums, flexible connections and piping. The production in multipurpose plants is supported by an equally modular and flexibly structured automation concept with integrated recipe operation. This allows manufacturers to react much more quickly to rapidly changing demand.

Planning processes in transition

The design phase is critical in multipurpose plants. The multipurpose plant will be able to optimally satisfy the requirements only when both partners – the customer and the plant design engineer – pool their respective expectations and corresponding know-how in close alliance during this phase. The interaction of process and plant engineering expertise also enables an integrated process development parallel to the planning and construction of the production plant.

It is this integration of process technology, plant technology, and automation that is one of Siemens’ strengths. In addition to proven and efficient automation solutions based on Totally Integrated Au-
Tomation with the Simatic PCS7 process control system, Siemens can also exploit the know-how of the company’s own process and engineering experts to adapt the functionality of the multipurpose plant to the requirements of the various product classes. In addition, Siemens is able to provide local customer support in important growth markets such as Latin America and Asia. The combination of all these different fields of expertise under one roof also eliminates friction losses and unnecessary interfaces.

Typicals save time

Multipurpose plants can be implemented faster with preassembled, tested solutions – both in plant technology and, for example, in safety technology and automation. Siemens has designed and developed typicals for routine tasks in the chemicals industry that encompass not only tasks and functions needed for key production processes, subplants, and utilities, but also for the automation technology.

Other basic requirements of the automation of multipurpose plants are the close, flexible integration of process and production management and providing a link to the company’s management level.

The Totally Integrated Automation (TIA) platform from Siemens offers a solution for automatic recipe-based operation according to the ISA S88 standard, using the Simatic PCS7 process control system with Simatic Batch 6.0.

Tasks that accompany production, such as material management, tracking and tracing, compliance management, and laboratory information management, are managed by the MES concept Simatic IT within the scope of TIA. Customer orders are passed on directly to production plants and production data are fed back by linking Simatic IT to the company’s management-level systems.

The market asks for solutions rather than products

Greater differentiation and the integration of service and support by producers of fine and specialty chemicals are important trends in the chemicals market, in the opinion of Dr. Wolfgang Falter, partner and head of the Chemicals Competence Center at Roland Berger Strategy Consultants. “The trend toward commodity products in all sectors of the chemical industry means more and more process and less and less product innovation,” he argues. “In this respect, the automation technology, in addition to the process and plant technology, is an important instrument in improving the space-time yields, selectivity, and activities in comparison with competitors. Process and automation technology providers are well advised to offer their customers more flexible and modular technologies to give the customer a competitive edge in the life cycle of the plants.

“However, the emphasis is on time, cost, and quality advantages in the process, and improved product properties. This demands joint development with customers, intensive application-technical consulting, and providing solutions to problems in combination with the products. The more the fine and specialty chemicals manufacturers succeed in establishing themselves in such a service- and know-how-intensive business, the greater the value potential. This increased value also includes production’s ability to respond to new demands with flexible plant concepts. If the differentiation strategy is to move toward greater flexibility, multipurpose plants are an additional incentive for implementing such a strategy.”

Find out more:
www.siemens.com/chemicals
E-Mail: claus.koppermann@siemens.com
Migration of the Process Control Systems at BASF in Ludwigshafen

Proven Benefits, Future Growth

In the more than 135 years since the founding of BASF, the Ludwigshafen location – which has about 2,000 buildings spread over an area of seven square kilometers – has grown into the world’s largest single chemical production site. The range of products made by BASF Ludwigshafen extends from raw materials for plastic production to special chemicals and basic ingredients for the pharmaceutical industry. BASF is always seeking new ways to increase the efficiency and flexibility of production and to achieve success with new products. The performance chemicals plant is no exception. Within the scope of an expansion to increase capacity, BASF decided to use the new version 6.0 of the Simatic PCS 7 process control system in October 2002.
What looks like blue glass beads is actually water sprinkled on a wooden surface impregnated with Lotus spray. The spray – a laboratory product of BASF Performance Chemicals – produces the natural “Lotus effect” using the latest polymer know-how: BASF researchers have combined nanoparticles with heavily hydrophobic polymers and formulated them with a propellant similar to hair spray. BASF has recently begun producing performance chemicals with PCS 7 and Simatic Batch.
The BASF specialty chemicals factory at the Ludwigshafen complex manufactures products with tailor-made properties for diverse areas of application. The total of about 280 products are present as invisible helpers in many products for the private and industrial sector, from washing clothes to domestic and commercial cleaning processes, to refining surfaces, to disinfecting and preservation.

**Generation change: Consistency through coexistence**

The specialty chemicals factory, established in 1956, is part of the BASF “Verbund” system. The raw materials for the numerous processes undergo batch processing in this unit. Until recently, the complex processes were controlled by a Teleperm M system. The operator stations of the Teleperm M system were replaced by new PCS 7/TM operator stations in 2000, as part of a factory modernization. The automation systems were also replaced by a more efficient compatible successor system.

Innovations in the field of specialty chemicals demanded an expansion of plant capacity at the beginning of 2002. The new additions to the plant were to be housed in an adjoining factory extension. The aim was to continue to use the existing infrastructure and integrate the extension into the existing facilities – and all this, of course, during ongoing operation, because the factory had to continue to process the inflow without interruption.

The BASF and Siemens project teams joined forces to develop several alternative solutions: first, the continued use and extension of the existing Teleperm M process control system; second, the extension of the existing system with Simatic PCS 7 and migration of the Teleperm M automation system; or third, the complete replacement of the existing process control system.

BASF evaluated the three concepts with regard to functionality, satisfaction of company requirements, minimization of production loss, economy, and guaranteed spare parts. The migration solution won in the end. BASF was convinced not just by the lower costs in comparison with the new system but above all by the possibility of integrating the existing systems during ongoing operation.

“The expansion possibilities and the compatibility of the migration components in particular were important, but the uniform HMI level of the Teleperm and Simatic PCS 7 process control system also impressed us very much. This was a decisive factor in awarding the project,” reports the factory manager in Ludwigshafen.

**Batch management tipped the scales**

The various chemicals are produced discontinuously on the basis of individual recipes in the multiline plant. Therefore, flexible and efficient management and maintenance of the recipes was one of BASF’s essential requirements. After as-

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BASF Ludwigshafen is one of the largest chemical production complexes in the world

**A worldwide leader**

BASF is the world’s leading chemicals company. The company offers its customers a high-powered portfolio that includes chemicals, plastics, refining products, pesticides, and fine chemicals and stretches as far as crude oil and natural gas. In 2002, BASF, which has 89,000 employees, achieved sales of approximately 32 billion Euro.

The product range of refining chemicals for washing and cleaning agents, as well as formulators, includes water-soluble polymers for detergents and technical applications, along with additives for detergents, such as color transfer inhibitors, non-ionic surfactants, polyalkylene glycols, emulsifiers, defoamers, chelating agents, polyethylene waxes, mining waxes and wax emulsions, chemicals for the electroplating supply industry and electronic production, biocides, dispersing agents and corrosion inhibitors. BASF is one of the world’s leading manufacturers of these products. The company’s customers benefit from BASF’s innovation and market-oriented research activities, which offer efficient and lasting solutions. The company’s cutting-edge chemical expertise and its global development and marketing activities give its product users a strategic lead in their markets.
sessing the risks together with Siemens, the BASF project team gave the initial go-ahead to use the Simatic PCS 7 version 6 with Simatic Batch during the project phase in October 2002. The extended batch functionality and the improved configuration-in-run features were the key aspects that convinced BASF to use the new version.

The entire system was configured at Siemens in Karlsruhe, owing to the close vicinity to system development. The final factory acceptance test (FAT) was also conducted in Karlsruhe. The new control system was rigorously tested with Simit simulation software.

Real plant conditions can be simulated with this software tool so that the transient behavior of the systems and the recipe control can be simulated and optimized. This simulation enabled the first control system components to be delivered before the official release of version 6.0.

In this project phase, all the teams involved worked closely together – with the result that all agreed deadlines were met. Siemens Project Management and Controlling made an especially good impression on the BASF team. “The good partnership between Siemens and BASF, the fast reaction to emerging problems, and the professional handling of the final function test at Siemens were critical to the project’s success,” says Jürgen Hochdörfer, the DCS lead engineer at BASF.

Higher process yield
Another central aspect of the new plant addition is the safety technology. The production materials are flammable and, if handled improperly, can pose a risk to human health. The synthesis itself is also heavily exothermic. Therefore, the process must be monitored continuously to prevent critical plant conditions.

Since the shutdown criteria depend on the current state of the process, BASF uses a fail-safe controller that calculates the shutdown limits from the process information using a mathematical model. The process-dependent shutdown values are displayed on the Simatic PCS 7 operator station in special screens. Using this technology, the batch times can be reduced and the plant yield increased.

Siemens supplies modular Sivacon low-voltage switchgear for the electrical power supply systems. All electric drives in the plant expansion can be controlled directly by the automation system via Profinet, thanks to Totally Integrated Automation. This simplifies not only the assembly but also the maintenance and commissioning of the equipment. The existing Teleperm M automation systems have also been integrated via Profinet.

No interference with ongoing production
After successful final function testing, one major challenge remained: the integration of the new systems with the existing plant during ongoing operation. The team spirit of all those involved was called upon once again to guarantee trouble-free progress in this critical phase of the project.

“We were interested not only in the product process control system but also in a solution for operating, controlling, and monitoring the complex processes. Siemens’ willingness to adapt the PCS 7 to the customer’s requirements was, in my opinion, a key factor in the successful integration of the extension into the old plant, explains Stefan Rouwen, the BASF engineer responsible for the migration.

Production in the new facility is now running to the full satisfaction of all those concerned. PCS 7 Version 6.0 is operating reliably and continues the success story of PCS 7.

Find out more:
www.siemens.com/pcs7
www.basf.com/detergents-formulators
E-Mail: a.keller@siemens.com

The speciality chemicals factory has produced a much greater yield since the successful migration to the new control system

Simatic PCS 7: The modern process control system from Siemens at a glance

- Based on industrial standards with robust hardware and software components
- Modern distributed client/server architecture
- Scalable from small lab systems to production complexes with 60,000 measuring points
- For all applications: continuous and batch processes
- For all industries: process, production, and hybrid areas
- Central systemwide engineering system
- Flexible and simple integration of field devices and drives based on Profinet
- Seamlessly integrated safety technology, certified by the TÜV
- Openness on all levels
- Maximum availability through redundancy on all levels
- Modularly structured Simatic Batch batch system, 21 CFR Part 11 compliance
Big order for Siemens at the new BASF site in Nanjing

Mega Project

BASF works with a Chinese partner to erect one of the largest petrochemical complexes in the world. Siemens won the job of providing the power supply system, the drive systems, and the analysis technology for the petrochemical complex, which will occupy an area of 220 hectares in Nanjing, China – because of the profound knowledge of the chemical industry Siemens has acquired through many years of partnership with BASF and other chemical manufacturers.

BASF-YPC Co., Ltd. (BYC), a joint venture founded in the year 2000 and in which both BASF and Sinopec/YPC have a 50 percent share, began the ambitious construction project in March 2002. In Nanjing, three hours from Shanghai by automobile, the sizable petrochemical plant will begin producing 600,000 tons of ethylene in early 2005.

The ethylene will then be converted into ethylene glycol, polyethylene and acrylic acids, methylamines, oxo-C4 alcohols, and other substances – a total of 1.7 million tons of petrochemical products per year. The total investment volume is U.S.$2.9 billion.

As the main electrical vendor for this project, Siemens is supplying the complete power supply, including the 110 kilovolt high-voltage transmission, medium-voltage switchgear, transformers, uninterruptible power supply, substations, and switchgear systems as well as the appropriate inspection and monitoring control technology. In all, the order amounts to several million euros.

In addition, Siemens will supply industrial compressors, drives, and process analysis systems as well as various services such as maintenance.

Local project management
To support its partners at the Nanjing site, Siemens has provided a lead project manager to serve as the one-person contact for all questions and problems. The Siemens project management team also coordinates production and delivery of the energy supply systems, which are preassembled in Germany, Italy, Finland, and China and then finished and installed in Nanjing. This personal presence is a pivotal factor in the quick, efficient implementation of the project. For example, with excellent cooperation from the Chinese and German staff on the project team, the first panels were delivered within just four months.

Installation of the panels began in mid-August this year. All the engineering and assembly work should be completed by the end of 2004, allowing the complex to attain 100 percent production on schedule at the beginning of 2005 – and Siemens will do its part to ensure this goal is achieved.

Find out more:
www.siemens.com/chemicals
E-Mail: thomas.dieckhoff@siemens.com

Nanjing (pictured here, the erecting of the complex’s first column) will be one of the largest complexes in the world by 2005
The U.S. company Air Products has signed a global alliance agreement with Siemens for process automation. The aim of the alliance is to facilitate the successful development and implementation of economic, value added, state of the art process automation and control systems for Air Products worldwide. Nearly one year after signing the contract, Air Products is still pleased with the cooperation – and is even contemplating a significant expansion of the alliance.

After a comprehensive market evaluation that took more than one year, Air Products and Chemicals, Inc. signed a five-year global contract with Siemens in February 2003. The “Global Alliance Agreement” that governs cooperation in automation and safety systems technology encompasses almost the entire range of automation and control technology from Siemens.

Shared policies and values
Air Products, one of the largest manufacturers of technical gases for industrial production, leads the world market in producing process gases for the electronics and semiconductor industries. The company takes pride in its innovative corporate structure, efficient work processes, and extreme consciousness of safety and the environment – values that also figure prominently in the Siemens–Air Products partnership, points out Mark W. Connor, Air Products’ director of supply management. “One of the main reasons we chose to partner with Siemens is that our two companies have similar values. Both consider integrity and commitment important – toward customers and employees.”

All projects on schedule
Richard O’Reilly, the manager responsible for process technology at Air Products, sees the alliance with Siemens as extremely positive. In his opinion, the credit for its success goes mostly to Chris Da Costa of Air Products and Alan Ellerbusch of Siemens, who have put considerable effort and commitment into the building this relationship. “We are on the right track. At present, we are executing several projects in all our major business areas using the PCS 7 and the Simatic product family.”

For Chris Da Costa, who coordinates automation technology projects at Air Products, the automation systems’ scalability, which starts with process visualization and encompasses everything from small programmable logic controllers right up to the large distributed control systems, was an important argument in Siemens’ favor. “Another important advantage for us is the extensive product portfolio engineered from a single integrated automation platform. Siemens is right out in front at the moment with its Totally Integrated Automation strategy along with the innovative engineering tools.” As it does in any business decision, price played an important role in Air Products’ selection of Siemens. Even more convincing, however, were the savings in life cycle costs, especially the cost for the migration of existing systems.

Optimistic forecast
For Jere J. Schneck, director of Asset Creation Engineering Services, the alliance agreement between Air Products and Siemens is only just beginning. “We know that Siemens has a lot more to offer than our contract covers at the moment – we are already getting compressors and analyzers, among other equipment from Siemens. Both parties in this alliance are sure winners!”

Find out more:
www.siemens.com/chemicals
E-Mail: alan.ellerbusch@siemens.com
Totally Integrated Automation controls production of soda ash

Ready for a Tough Market

Base chemicals are crucial for a broad variety of processes, from producing detergents to making bread – yet manufacturers of these products face fierce competition in global markets. Mass-production plants such as those for producing soda ash require large investments, but the profit margins are slim. Streamlined production with optimum use of resources is mandatory for those who wish to be successful in this market segment. Shangdong Huaihua Soda Ash Stock Co. Ltd. is among the leading soda ash manufacturers in China and intends to defend its pole position – with a new production facility in Weifang and the Totally Integrated Automation platform from Siemens.

Almost half of the world’s soda production is used as a raw material in the glass industry, with the chemical industry and soap and detergent production as other important fields of application. Soda can be produced either synthetically or through the processing of trona or brines. In Weifang, Shangdong Huaihua Soda Ash Co., Ltd. uses both limestone and brine as raw materials and produces light and wight ash as well as sodium bicarbonate.

At present, soda production in China amounts to a total of eight million tons annually – a figure that can be met by local production capacities. However, it is estimated that by 2005, the entire market for soda made in China could be as large as 10 million tons per year. To accommodate production to the growing market opportunities, while at the same time improving cost effectiveness in order to be able to compete with other manufacturers in both domestic and international markets, Shangdong Huaihua Soda Ash decided to increase its production by building a new soda plant in Weifang. The new plant will have a capacity of 600,000 tons per year.

Automating for cost effectiveness

As with all mass-market products in the chemical industry, profit margins are narrow and cost effectiveness is of paramount importance. Running production with an optimum use of resources, energy, and staff, as well as scheduling process loads to suit market demands, requires close interaction not only between the individual production units but also between production and management. Shangdong Huaihua Soda Ash was therefore looking for a process control system that would provide an integrated solution for controlling the processes in the new plant as well as have the ability to integrate management and production planning information into the control system.

Though facing strong competition, Siemens was able to secure the contract for the distributed control system (DCS) with a total of 9,588 I/Os. The benefits of Totally Integrated Automation – for example, the easy integration of real-time production monitoring systems – made a convincing case for Siemens, as did the expertise and commitment demonstrated by the Siemens project team in the bidding phase.

Moreover, since the new plant is a typical distributed production site with process units scattered over a relatively wide area, Profibus networking offered the potential for considerable savings with its powerful uniform fieldbus protocol.
Additionally, the integrated high-availability AS 400H automation systems of the Simatic PCS7 process control system had several unique features that could not be matched by other bidders’ systems. With PCS7, Shangdong Huaihua Soda Ash can use one control system to control and monitor both field instrumentation and power supply components, as the monitoring system of the electrical power supply is also equipped with a Simatic controller and can be seamlessly integrated into the Siemens control system.

Another important aspect of the system was the exchange of information between management and process control. Because PCS7, as an integral part of the Totally Integrated Automation platform, uses open and standardized interfaces, the management information system at the Weifang site can easily communicate with the DCS.

From contract to FAT in just seven months
Shangdong Huaihua Soda Ash Co., Ltd. and Siemens Industrial Automation Shanghai (SIAS) signed the contract on January 17, 2003. Just seven months later, at the beginning of August, the successful factory acceptance test (FAT) was conducted, marking an important milestone in the smooth execution of this large project. SIAS engineers were responsible for the DCS design, system integration, and project management for the DCS and also supported the customer in programming and commissioning tasks. Additionally, SIAS held PCS7 training courses for the staff of Shandong Soda Ash.

The entire automation system is currently being delivered for final installation at the Huaihua site. The professional project management and engineering provided by SIAS and the excellent performance of PCS7 have made a very positive impression on Shandong Soda Ash. With this project, Siemens has demonstrated not only its technological expertise but also its project management and engineering know-how – and has given an excellent example of what the combination of these skills can achieve.

Find out more:
www.siemens.com/chemicals
E-Mail: jun.yao@siemens.com
The refinery, located in the state of Tamaulipas, directly on the Gulf of Mexico, has been in operation for more than 30 years and has been processing up to 2.3 million tons of crude oil per year. Sixteen new processing plants have been erected within the scope of extensive modernization and new building measures. Nine of the existing units have been expanded and equipped with additional high-performance technology, increasing the capacity of the complex (which covers five square miles) to more than eight million tons of crude oil per year.

Complete switching and control technology from Siemens

Like the refinery’s output, the electrical requirements for plant operation are immense: 15 times the machinery required to operate a gas and steam power station. The extensive equipment of the new refinery was chosen to satisfy very strict quality criteria and adapted to meet local requirements.

The majority of orders for equipping the plant were awarded to Siemens. In addition to two complete industrial turbine generators and the entire switchgear, control, and communication technology for the newly created units, many of the approximately 29,000 field devices are also from Siemens – for example, nine gas chromatographs, approximately 5,000 pressure and differential pressure transmitters, approximately 180 conductivity and pH sensors, 15 Ultramat gas analyzers, and more than 1,800 Sipart PS2 positioners.

Among the special demands on the control technology was the need to integrate a large number of field devices from different manufacturers into one control system and enable data exchange with the existing control systems. On the basis of positive experiences at the Mexican refinery at Cadereyta and detailed project-related studies, PEMEX chose the Teleperm XP process control system with the Simatic PDM (Process Device Manager) from Siemens.

HART management system with Simatic PDM

The central HART management system for controlling the new plants connects approximately 14,700 analog devices with a wide scope of functions. The HART protocol is an international standard that enables data exchange with field devices without additional wiring. To do this, a digital signal is modulated onto the 4–20 mA signal by means of frequency shift keying. The other 14,300 field devices are simple field devices without communication capabilities. Simatic PDM is redundantly connected by an optical Ethernet ring to eleven satellite rooms, which are up to five kilometers away from the central station. Up to eight HART multiplexers are installed in these distributed control units.

The field devices are connected to the I/O cards of the multiplexers, and their HART signals are transmitted via the service bus to the control system through the PDM. This is impossible in this case due to the great distances between the satellite rooms and the high number of multiplexers in the control system of the refinery. Therefore, the signal is converted from HART to Ethernet for data transfer between the control stand and the satellite room.

Largest-ever Simatic PDM project completed successfully

Control and Communication

The fully overhauled PEMEX refinery in Madero, Mexico began operating commercially on October 25, 2002. That date marked the completion of one of the largest industrial projects in Latin America, after just 40 months’ building and planning time. A particular challenge was the integration, parameterization, and commissioning of approximately 14,700 field devices of different manufacturers in a control system that is also able to communicate with other networks. To accomplish this complex task, the state-owned Mexican PEMEX, the operator of the refinery, chose two Siemens products: the Teleperm XP process control system and the Simatic PDM (Process Device Manager).
For PEMEX it was very important to be able to operate field devices directly from the satellite rooms. Therefore, facilities were provided for connecting notebooks locally to the LAN. This provides access to the data stored centrally in a database, such as address information, device descriptions, and parameter values, and establishes the link with the devices as from the central station. The changes made are saved directly in the central database using a uniform user interface.

Reducing costs through central accessibility

Maintenance is an important contribution to overall operation costs especially in plants the size of the Madero facility, because maintaining and managing such a large number of devices of different types from different manufacturers would normally result in enormously high costs. The HART management system with Simatic PDM considerably reduces maintenance costs due to the central accessibility of the field devices. The configuration, parameterization, commissioning, and diagnosis of the process devices can take place much more rapidly than before. The uniform user interface that Simatic PDM provides for the 14,700 field devices greatly simplifies the work procedures in the refinery. Training costs for employees are also reduced because there is no need to learn the operation of individual devices.

The new system went into operation at the PEMEX refinery at the end of October 2002 and since then has been working to the full satisfaction of all those concerned. Thanks to Simatic PDM, all field devices communicate flawlessly with the control system.
DuPont awards Business Based Maintenance contracts to Siemens

Benchmarking Maintenance

To exploit the full potential of maintenance processes and consistently implement improvement measures, DuPont invited external maintenance technology providers to bid for contracts at five European locations. In the competitive bidding process, the maintenance specialists from Siemens edged out other providers through a combination of technical strengths, ability to provide qualified local resources, quality and price.

Global competition and the increasing need to reduce costs are promoting the trend of using external companies and technologists to bring world class practices and technologies into manufacturing companies. Improving plant maintenance has demonstrated benefits of longer production phases within the useful life of industrial plants and reduced operating costs throughout their life cycles. To that end, the multinational DuPont company decided to call upon external maintenance experts for its factories in the Netherlands, Germany, Luxembourg, Belgium, and Spain. With its Business-Based Maintenance concept, worldwide reference projects, and compelling price structure, Siemens was able to win the order.

First step: Consulting

Both parties signed a contract for maintenance consulting at all five factories. “The first concrete step in this agreement is the maintenance business review (MBR), which determines status of maintenance practices and processes versus world class standards, identifies potential maintenance needs in the plants and forms the basis for concrete maintenance schedules and work,” explains Marcus Fermann, one of the Siemens managers responsible for the industrial service business. This maintenance business review has already been completed in all five plants by two international teams staffed by central support and local experts. Three sites have proceeded with implementation of a custom maintenance strategy, with Siemens providing technology leadership and subject matter experts who support the DuPont site teams. These initiatives are expected to provide significant savings in these plants.
Success is measurable

Maintenance costs normally account for between 5 and 40 percent of operating costs, depending on the industry and type of company. This percentage can be reduced considerably with proven maintenance packages from external service providers such as Siemens. At the same time, plant availability can be greatly increased by adopting a sophisticated maintenance strategy. “It is not merely a question of optimizing the maintenance in a technical sense, but also of its effect on the financial goals of the company. The intense cooperation in this maintenance sector will forge partnerships in plant management and extend the goals,” argues Marcus Fermann.

Savings in maintenance costs are measurable, as is the reduction in failures and outage times – which means increased plant availability and reliability. In addition, efficient maintenance leads to a lasting improvement in plant performance and therefore profitability. A productivity growth rate of 10 percent is possible with the Business-Based Maintenance strategy from Siemens, while at the same time maintenance costs can be reduced by up to a third.

Evaluation based on key performance indicators

The improvements achieved by using such service packages are determined by so-called key performance indicators (KPI); the type and significance of every indicator is adapted to the financial goals of the company.

The Business-Based Maintenance concept from Siemens integrates all industrial maintenance tasks, allowing companies to concentrate on and further optimize their core business.

Find out more:

www.siemens.com/simain

E-Mail: christine.meier@siemens.com
New regulations may be an opportunity

Big Bang or Isolated Systems?

“IT systems make production and sales of food and beverages easier, more flexible, and safer; they are absolutely indispensable in a modern enterprise.” “IT costs a lot of money and it is doubtful whether the investment pays off in the end.” These statements, made by two attendees at the symposium “IT in Food Production” in Munich in September 2003, clearly demonstrate how controversial the discussion about the opportunities and possibilities of IT systems is in the food and beverage industry.

However, it is indisputable that the use of tracking and tracing systems will become mandatory for many companies as of 2005 at the latest, when the EU directive 178/2002 comes into effect. This directive will oblige the manufacturers of all products destined – even indirectly – for human consumption to document their flow of goods. This task is practically impossible without the appropriate IT tools. Also indisputable is the fact that the implementation of these systems is a considerable investment for many companies. The obvious question is what are the benefits of such systems?

Recognizing and exploiting opportunities

The improved process transparency and traceability being demanded by law can also bring the manufacturer important advantages. For example, the exhaustive documentation confirms that the raw materials were satisfactory, logs how these raw materials were processed, and ensures that all final products comply with all specifications. In this way, the company is able to quickly examine and ensure the safety of its own products.

In addition, the linking and networking of product information also makes it possible for the company to critically examine its own procedures, especially the logistics processes before and after actual production. Even if a company believes that it has already exhausted all potential for increased rationalization, new possibilities for savings can be found in this way. That is the strongly held opinion of many experts.

Alternatives to the Big Bang

Over the long term, few companies will be able to survive without introducing IT-supported tracking and tracing systems. However, to keep the costs at a reasonable level and to protect existing investments, the food industry is looking for alternatives to the “Big Bang” – that is, the complete changeover to a new IT system.

Modular, standardized concepts such as Simatic IT, which can be implemented in stages and integrated into an existing heterogeneous IT environment, are a favorite solution.

Service expertise decisive

In this context, a great deal more is usually demanded of the suppliers of such systems than mere implementation. The ability of a new solution to optimally mirror the processes and operate reliably and cost-effectively depends to a great extent on the industry-specific and consulting expertise of the technology partner.
Many companies therefore appreciate Siemens’ global account management especially for the observance of agreed standards and the adaptation of successful solutions to other tasks.

The standard interface of the account manager includes all information and coordinates all activities, minimizing friction losses and enabling prompt and efficient project handling.

This is often a decisive advantage, particularly in the food and beverage industry, in which the market and the legal conditions can change very quickly.

Find out more:
www.siemens.com/beverages
E-Mail: ruediger.selig@siemens.com

Dr. Harald König, head of automation technology at Südzucker AG:
"Process automation is what has enabled the high throughputs of up to 15,000 tons of beet per day – at a consistently high quality – in the sugar industry. Today we have at our disposal technologies that are extremely sophisticated; the sources of problems are therefore more often than not found in project handling rather than directly in the area of technology. The service factor plays an important role in the successful implementation of technology. When I award a contract – for example, for the installation of a process control system – I have to rely on the technology working without a hitch. Siemens’ global account management is extremely helpful in this regard. Such a system allows me to really define and implement standards."

Dr. Thomas Oestreicher, head of development at Krones AG:
"Despite constant mergers and acquisitions in the beer market, there are still small breweries that do not need elaborate IT systems because transparency is inherent due to the small size. However, when a company has reached a certain size, IT is absolutely indispensable. An IT system must be able to precisely mirror the entire delivery chain and ensure the traceability of single batches – not only because it will be required by law as of 2005, but also because it simplifies efficient process control."

Johannes Siepert, technical manager at Rhein-Main-Sieg Getränke GmbH & Co. KG:
"What we require are standardized, modular IT solutions. We have already drafted an appropriate specification with Siemens as a possible partner for implementing such a solution. The Coca-Cola organization operates many production sites in Germany, and it is therefore important to have uniform standards everywhere. Ideally, I envisage a package of components that is easy to install, and every company just uses the modules it needs.”
Front end engineering and design services

A New Way to Do Business

Whenever a new plant or process is designed, quick implementation, cost-effective realization and fast return on investment are mandatory requirements of today’s markets. Front End Engineering Design (FEED) services will result in significant cost savings and a better or new documentation. Moreover, FEED will minimize change orders and lead to a firmer project scope and optimized implementation strategies.

Using proven methodologies, templates and industry expertise, Siemens consultants bring years of experience in the successful execution of capital projects into a FEED consultation.

Automation and IT consulting

Automation consulting identifies potential areas for improvement in automation planning, design, and functional requirements in a production facility. FEED identifies areas with inefficiencies and optimizes automation strategies in existing systems. Moreover, an independent audit of existing IT infrastructure solutions and a review of future needs results in comprehensive solutions for integrating and transforming plant floor and business system data into meaningful business information.

Electrical infrastructure and field instrumentation

From power system analysis, conceptual design, outdoor and indoor substations, switchgear, motors, drives and automation, Siemens reviews the current electrical infrastructure of a plant or production site for energy and cost saving potential. Siemens also offers power monitoring and management.

Instrumentation consulting services include detailed point-by-point audits of all existing and planned instrumentation requirements. Siemens also provides assistance from experienced field engineers on difficult applications, assessment and implementation of remote inventory systems, and complete maintenance support for plant instrumentation.

Process analysis and plant layout studies

Siemens has process expertise in the unit operations for chemical and pharmaceutical processes such as mixing, reaction technology, and crystalization. Siemens expertise includes analyzing the process steps to separate solid-fluid mixtures. Siemens also offers process design and optimization services including trial runs. Layout studies determine the technique and market relevance of the facility’s general framework, including quality and costs.

Process safety analysis and maintenance consulting

Siemens consultants can map out currently accepted safety measures as they apply to different plant areas and also create safety calculations for stipulation and valuation of technical safety parameters. These services help design and optimize safety considerations and enable effective risk analysis. Of course, FEED includes maintenance and asset performance services that will for example reduce maintenance costs by 20 to 30 percent while increasing plant availability.

Find out more:
www.siemens.com/servicesupport
E-Mail: kevin.mcdevitt@siemens.com
Siemens gas chromatographs at the largest bioalcohol manufacturer in Europe

Strong Position

The Spanish company Abener Energia SA is the largest manufacturer of bioalcohol in Europe, with production of approximately 226 million liters per year. A precise analysis of the sample flows is absolutely indispensable during the manufacturing process. Two Maxum edition II gas chromatographs from Siemens handle this difficult task in the company’s new production plant.

Analytical technology must meet high demands in the industrial production and processing of alcohols, the analysis must meet high demands. This is true for Abener SA, which is located at the refinery belonging to the Spanish crude oil company Cepsa in La Rabida. There, ethyl-tertiary-butylether (ETBE) is made from bioalcohol (ethanol) and isobutyl in a chemical process, and methanol obtained from natural gas is turned into methyl-tertiary-butylether (MTBE).

Main application as fuel additives
Both ETBE and MTBE are fuel additives, used above all in the refining of unleaded fuel. Therefore, Spanish crude oil companies such as Cepsa are among Abener’s biggest customers.

When Abener decided to build a new production order for the turnkey configuration of the analysis system and integration into the new production plant was placed with the Cegelec system house. After examining the options for suitable gas chromatographs, Abener and Cegelec chose the Maxum edition II from Siemens.

The Maxum edition II combines various detectors with a flexible furnace solution. In this way, varied gas chromatography measuring tasks can be performed with a single device. In addition, the Maxum edition II can communicate via Ethernet and TCP/IP protocol with a PC, other chromatographs, or a process control system.

Cost effective and powerful solution
The measuring and analysis tasks required by Abener can be accomplished with just two Maxum edition II chromatographs – a very compact and cost-efficient concept. The products under analysis are actually measured in a total of six streams, for both ethanol and methanol in the respective product campaign. The numerous references demonstrating that these systems are already working reliably in ETBE plants were instrumental in the decision to implement Maxum.

The progressive device concept, the fast cycle times of only six minutes per stream, and the easy interleaving of the sample streams are also advantages of the Maxum device.

There was previously only one Maxum edition II in La Rabida, used for measuring n-butane and isobutane in naphtha and for measuring ethane in propane. With the two new devices, Siemens now has a stronger presence in the refinery, increasing the company’s chances of being considered for future projects at the Cepsa facility.

Find out more:
www.siemens.com/processanalytics
E-Mail: thomas.lenk@siemens.com

process news 4/2003
Wastewater Treatment

CASE STUDY

UNTIL RECENTLY, APPROXIMATELY 500 HOUSEHOLDS SPREAD OVER A WIDE, SPARSELY POPULATED AREA WEST OF OLYMPIA, WASHINGTON, WERE NOT CONNECTED TO A PUBLIC WASTEWATER SYSTEM BUT HAD INDIVIDUAL SEPTIC SYSTEMS. A NEW GOLF COURSE AND NEW HOUSING DEVELOPMENTS, HOWEVER, RAISED THE DEMAND FOR A CENTRALIZED WASTEWATER TREATMENT FACILITY TO ACCOMMODATE HEALTH STANDARDS.

Widespread area

Considering that the area serviced stretches over several square miles and is interconnected by an inlet of the Puget Sound, implementing the new system was quite challenging. The engineers had to find a control and monitoring system that could easily bridge great distances and that was also robust enough to operate reliably with minimal maintenance.

Five pump stations collect the wastewater from the households and pump it into a central reclamation facility. After that, the wastewater is filtered through a rotary screen and then pumped into two batch reactors, where the wastewater moves through anoxic and aerated treatment cycles alternating with rest periods. After the treatment cycles are completed, the wastewater is decanted and fed through a rotating drum filtration system. The water then flows under banks of ultraviolet lights for further decontamination.

The engineers responsible for implementing a control system for a new wastewater treatment facility on the U.S. West Coast literally had to scale a few cliffs, as part of the serviced community was on the other side of an inlet of the Puget Sound. In view of the great distances involved, the entire wastewater network, including all the pump stations, had to be integrated into a common control system; local monitoring would have been too expensive and difficult.

The project team was impressed by the robustness and reliability of the Sinaut telemetry system, which then became the first choice for further expansion of the wastewater facility.

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Information Flow

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The project team was impressed by the robustness and reliability of the Sinaut telemetry system, which then became the first choice for further expansion of the wastewater facility.
The reclaimed water is pumped into a pair of two-acre reservoirs where it seeps into the ground, ultimately filtering back to the water table. Excess water is pumped to a system of sprinklers located throughout an approximately 30-acre parcel of wooded land.

Because the stations are spread out over such a wide area, it was impossible to implement a conventional control system for monitoring the pump stations. The members of the project team looked for an alternative, which they found in the Sinaut telemetry system.

**Versatile communication options**

Every one of the five pump stations is equipped with a Simatic S7-300 controller, a Simatic HMI Touch Panel, and a Sinaut TIM interface module as a slave. In three pump stations the TIM module transfers the data to the master TIM via a dedicated phone line. The master TIM then routes the data to the host computer in the control room. The fourth pump station communicates via a twisted-pair cable, and the fifth station, on the other side of an inlet of the Puget Sound, is connected by radio with one of the slave TIMs, which passes the data on to the master module. Another Sinaut TIM connects the S7-300 controller for the sprinkler system to the central system.

In this way, the individual stations are seamlessly integrated into the wastewater treatment control system. The project team was particularly impressed by the simple implementation of the communication with Sinaut, because Sinaut uses a proven protocol and transmits all data transparently to the central computer without complicated programming. This greatly reduces the configuration time and potential sources of error.

In the central reclamation system, the WinCC-based Sinaut ST7cc control system displays the data clearly, allowing the staff to monitor and control all the processes from the ST7cc. The TIMs at the pump stations are time synchronized, so time-critical and parallel processes can easily be planned and initiated from the control room.

**Further pump stations under construction**

The system has proven very robust. No data is lost even when a connection breaks off abruptly; the system stores the information in a memory buffer storage and transmits it when the line is back up. Due to the system’s excellent performance, two new pump stations that are currently being built will also be equipped with Sinaut.

**Robust solution for widely distributed plants**

Supply systems for drinking water and district heating, pipelines and distribution networks for gas or oil, and sewage systems with their numerous rainwater reservoirs – these systems often consist of subcomplexes distributed over large areas.

The Sinaut ST7 telemetry system was developed specifically for such tasks. Using the robust, proven hardware platform of the Simatic S7 series, widely distributed plants can now be integrated into a plantwide control system by different communication networks – for example, via radio, modem, or wireless LAN. Even with the implementation and combination of different transmission pathways, Sinaut provides an efficient and secure data exchange, thanks to an integrated acknowledgment procedure and complex measures securing against data loss, data fraud, and unauthorized access.

With the Sinaut ST7sc software package, the telemetry system can be integrated smoothly with existing control systems via OPC. In addition, Sinaut provides its own HMI system: Sinaut ST7cc is based on the Simatic WinCC display system and, of course, also provides data interfaces to industry packages such as PM AQUA or ACRON.

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Find out more:
www.siemens.com/sinaut
E-Mail: guenter.m.baumann@siemens.com
Forum for users of field and analysis devices on the topic of safety technology

Standardized and Proven

As the chemicals industry moves toward international safety standards, the standards IEC 61508 and 61511 replace the previously common practice of examining components individually. Instead, the entire technical safety system is tested, including sensor, actuator, fieldbus, and controller. Both users and manufacturers of system hardware and software share responsibility for proving plant safety.

The new standards demand a quantitative risk assessment – based on calculating the failure probability – relating to the operation of production plants. The failure probability is calculated individually for each component and its wiring. The probability of failure is summarized for the safety circuit as the safety integrity level (SIL). The sum of individual circuits gives a reliable failure probability of the whole safety system.

Users and manufacturers both evaluate safety

In these safety observations, hardware and software are tested and documented during all phases in the life cycle of the plant, from the design through the various stages of development up to operation and maintenance. Both the user and the manufacturer must make these assessments.

The user must study the entire plant – or the entire operation, including plant, subplant, and technological equipment – and describe the procedure for the plant in a safety-technical management system. This includes all of the protection circuits, with documented risk monitoring over the entire life cycle of a loop, in accordance with IEC 61508 and 61511. Status quo protection applies to existing plants that have already been evaluated.

Principle of proven operation

Due to the extremely varied operating conditions in the chemicals industry, it is not usually possible to keep statistical proof as the standards prescribe. If statistically reliable data from devices in permanent use is available, or if the end user can provide results from specific trial runs and type testing, these devices can nevertheless be used, based on the principle of proven operation.

Siemens has taken the requirements of the standards and responded to them with safety-oriented products – including the development of new field and analysis devices. Action is being taken to avoid and cope with faults, both in production and in plant operation. Devices already in use can be assessed by the “proven operation” principle. Examples and sample calculations document the high safety standards of Siemens field devices.

Find out more:
www.siemens.com/chemicals
www.siemens.com/safety
E-Mail: hans-juergen.huber@siemens.com

Always ready to listen

The forum for users of field and analysis devices answers your questions about this and other topics.
E-Mail: forumchemical.pia@siemens.com
Improving analysis workflow with Simatic IT

Quality is a First Priority

Solvay, an international company with headquarters in Brussels, is a market leader in the chemical and pharmaceutical industry. Solvay has seven research centers all over the world, among them the company’s main research institute in Brussels. Brussels is also the location of the “Direction Centrale Recherche et Technologie – Analyses” (DCRT-AN). This institute has the objective to develop and fine-tune the analytical skills, which are needed in order to provide customers and partners with innovative and competitive solutions. Since the beginning of this year, Simatic IT Unilab is part of this objective.

At the DCRT-AN, 65 researchers carry out some 30,000 analyses per year. Quality is a first priority here, so when their custom-made management analysis request system proved not to be reliable any longer, Solvay decided to purchase a Laboratory Information Management System (LIMS).

A number of very specific requirements were formulated for the new system. The LIMS had to be able to manage the whole analysis workflow from the customer’s request up to and including a validated response as well as the relevant quality control systematically carried out by the DCRT-AN. In order to guarantee higher productivity, tasks such as customer reporting were to be automated. In addition, the new solution had to be able to handle administrative and accounting tasks.

After a thorough evaluation, Solvay opted for Simatic IT Unilab. In addition to good references and a competitive price, Solvay appreciated Unilab’s functionality and flexibility as well as comprehensive web features. Moreover, the dedication and enthusiasm of Siemens’ multilingual project group were a decisive aspect in this decision.

Excellent results already in the first year

Jean-Pierre Claessens, project leader with Solvay says: “An accurate project specification and the full support provided by Siemens guarantee long-lasting and successful collaboration. Siemens is a proactive and future-oriented partner who will always inform us about the consequences of important decisions. Such an attitude creates a great deal of trust.”

Solvay started using Simatic IT Unilab in the beginning of 2003, and the laboratory staff is already convinced of the advantages of Simatic IT Unilab for the day-to-day operations of the laboratory. For example, generating customers’ research requests has become easier, thanks to the web version of Simatic IT Unilab which is available via Solvay’s Intranet. In the short term, Solvay is already planning additional implementations of Simatic IT Unilab to improve existing procedures. Furthermore, Solvay wants to generate control charts on instruments and analysis methods via the LIMS, in line with their quality program (ISO 17025).

Find out more:
www.siemens.com/simatic-it
E-Mail: inez.costenoble@siemens.com
Process visualization solution with Simatic WinCC in the Kulmbach wastewater treatment facility

Open and Reliable

The Kulmbach wastewater treatment facility has been expanded several times in recent years, and additional small pumps and sewage stations nearby are to be integrated in the future. For this reason, the new redundant process visualization system had to be able to integrate distributed stations. Hermos GmbH, offering a solution based on Simatic WinCC, came out on top in an Europewide bidding process. The operators have since benefited from simplified procedures and faster, more reliable process visualization.

T

hanks to the fully biological wastewater treatment facility in Kulmbach, the water quality in the river White Main has improved considerably over the past 30 years. And due to the continued modernization and expansion of the plant, the Kulmbach facility will be making a major contribution to water conservation in the future.

New system with room for expansion

Because the existing visualization system was nearing the end of its expected lifespan, and the year 2000 was fast approaching, the municipal facility authorities decided to implement a new system. After various systems were evaluated in a qualifying procedure, Hermos Anlagenautomatisierung GmbH in Mistelgau, equipment supplier to the council authorities in Kulmbach for many years, emerged as the winner with a networked concept based on Simatic WinCC. Essential points in WinCC’s favor were that existing plant sections and automation systems could easily be integrated with WinCC, and the open system would allow the future integration of distributed remote facilities.

The new visualization system, which provides complete redundancy – even down to the power supply units of the two WinCC servers, which can be swapped during operation – was implemented gradually over a period of approximately 18 months. The visualization solution covers all sections of the wastewater treatment facility, as well as other remote facilities that were added during the course of the project; these facilities transmit their data to WinCC via an analog or ISDN connection. The new system was designed with adequate capacity available for future expansion. Tasks such as accounting and maintenance were also integrated into WinCC via Add-Ons.

Fast, easy to use, and reliable

In order to guarantee the users’ acceptance and rapid familiarization with the system, the established look and feel of the existing operating procedures was retained but was supplemented by a few new features. For example, the operator can now select a specific unit and view all the available information in a pop-up window.

Wastewater treatment facility manager Andreas Ott stresses the benefits resulting from the speed and reliability of the new solution: “The previous system was completely overloaded in certain situations; actions triggered on one computer were displayed on the other clients only after a delay, and sometimes even incorrectly. Even in extreme cases it now takes only a maximum of three seconds for all WinCC clients to be updated and, above all, reliably correct.”

Find out more:

www.siemens.com/wincc
E-Mail: birgit.gottsauner@siemens.com
Siemens EnviroRanger reduces energy costs at South West Water

Cost-effective Pump Control

Managing energy costs is an ongoing challenge for South West Water that holds the water and sewerage appointments for the South West of England. This challenge was made even more important since energy unit costs have differential rates according to the time of day and season, and can increase overall costs by up to 15 percent. During high cost periods, additional charges based upon transmission charges can occur during which time users are notified to reduce energy consumption. Notification can come at short notice requiring quick adjustments to avoid added costs.

South West Water worked with Siemens to test and refine the EnviroRanger, a new state-of-the-art pump controller. Following a trial with one unit over a six month period, the region installed eight EnviroRanger ERS 500 controllers in seven pumping stations dedicated to saving energy costs as well as control. The results of this first installation were so promising that South West Water increased the total number of EnviroRangers in their network to 30.

Extra savings through remote monitoring

Formerly, each station required a level measurement system, programmable logic controller, and remote terminal unit for telemetry. EnviroRanger eliminates the need for multiple systems because it provides all the functionality required to control pumps, collect data, and communicate over the network.

Real-time pump control avoids pumping during the peak cost periods. This economy pumping regime pumps the well down to its lowest level before the premium rate period, and then maintains a higher level during the tariff period. A storm detection feature detects high rates of inflow and automatically switches back to normal pumping in a storm. This avoids overflows, ensures compliance with environmental regulations, and minimizes energy use in peak tariff periods. EnviroRanger monitors pump efficiency to remove a failed pump from operation, switch to a healthy pump, and flag a maintenance alarm. This is a useful tool for asset management and also reduces the need for routine manual site inspection, saving staff time.

Fast return on investment

"The key to achieving operating cost reductions is to use all the features of the EnviroRanger," says Robin Lennox, ICA Specialist with South West Water. "It eliminates the need for a PLC. Serial communications with our telemetry system simplifies cable installation providing enhanced remote diagnostics. We estimate we have cut our energy costs by almost 10 percent at certain sites. We have had a rapid return on our investment within the first year."

Find out more:
www.siemens-milltronics.com
E-Mail: stephen.milligan@siemens.com
In cooperation with Vinnolit GmbH & Co. KG, the most important manufacturer of polyvinyl chloride (PVC) in Germany, Siemens has developed an advanced process control (APC) package that simplifies the optimization of the manufacturing process for vinyl chloride (VC), a PVC pre-product. The aim of the process optimization is to achieve a maximum VC yield and to suppress the synthesis of by-products that lead to the formation of coke. To achieve this, the cracking furnace must be run as steadily and as close to the optimum reaction conditions as possible.

The new APC package uses a model predicitive multivariable controller that considerably reduces the influence of changing ambient conditions and short-term pressure and temperature fluctuations. The optimized process achieves a one percent higher turnover rate with the same fuel requirement. The VC process is internationally licensed by Vinnolit in cooperation with Uhde.

Nutrifeed, located in Veghel, The Netherlands, manufactures milk replacers, special feed, and dairy concentrates for young animals. It is one of the largest producers of young-animal feeds in the world, and markets its products globally. Products are based on pure, high-quality Dutch dairy ingredients. Quality is the key word for Nutrifeed. This extends to all aspects of the operation, even the bagging area. If a poorly sealed bag is delivered to the customer, it adversely affects the company’s quality reputation and the customer may even return the entire pallet. Nutrifeed wanted a reliable method of detecting poorly sealed bags and designed an innovative acoustic solution using the Sitrans AS 100 sensor. Now, open bags are reliably detected before they reach the pallet. This saves time and helps Nutrifeed guarantee the best quality to their customers.
Siemens has opened two additional industry portals since mid-2003. At [www.siemens.com/semiconductor](http://www.siemens.com/semiconductor) and [www.siemens.com/metals-mining](http://www.siemens.com/metals-mining) the visitor can find an extensive, modularly structured range of automation and energy technology solutions compiled to meet the requirements of these two key industries.

The Semiconductor portal presents solutions and products tailor-made for the respective processes in the fields of semiconductors, flat panels, solar cells, and MEMS. The portal includes ideas for equipment automation, building automation in production plants, and IT applications in the semiconductor industry. These topics are augmented by information on material handling automation and electronics assembly systems. The site also provides a number of application examples and case studies of projects successfully executed throughout the world.

The Metals and Mining Technologies portal presents the entire range of services and products Siemens provides for this industry, divided into steps along the process chain – from ore processing to the liquid phase to the hot and cold rolling process to strip processing. Siemens’ strengths are technological competence and the ability to integrate proven standards and adapt them to industry- and customer-specific requirements, thus considerably reducing integration expense.
The market for crop protection products is highly competitive: an extremely wide variety of active substances and intermediate products has to be manufactured in customer-specific batches, new products brought to market in the shortest possible time and patent lifetimes exploited to the full. Bayer CropScience AG is setting new standards with its new multipurpose plant in Dormagen, Germany. Through consistent use of fieldbus technology using PROFIBUS DP Siemens has implemented for the first time a fully integrated plant management system. This system collects information plant-wide from the process automation to the production control level, processes it and incorporates it seamlessly into the SAP system on site using SIMATIC IT Framework – all based on Totally Integrated Automation. And linked into this concept is the SIMATIC® PCS 7 process control system with SIMATIC Batch. The modular design of the plant supported by the MES solution permits highly flexible control of the production facilities, which can quickly be converted to other applications. Would you like more information on TIA? Of course! Send us a fax: 00 800/74 62 84 27 with reference AD/1010.

www.siemens.com/totally-integrated-automation