Totally Integrated Automation in the Oil and Gas Processing Industries

Treasures of the Earth
Siemens safely replaced the control system for the Oseberg Field Center without interrupting production

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Lurgi AG has found a partner for the development of new technologies in Siemens, states Dr. Ludolf Plass, senior vice president of sales technology at Lurgi AG

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Phased modernization helps National Starch halve cycle time with Simatic PCS 7 process control technology

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Dear Readers:

Industrial nations and booming economies such as China and India are experiencing enormous demand for energy and for the products of the chemical and petrochemical industries, and mineral oil and natural gas are still the most important sources of raw materials for these industries. As a result, worldwide oil and gas consumption will continue to rise in years to come. In the course of the entire production chain – from exploration and transport to processing of the raw materials – we offer our customers added value with solutions based on Totally Integrated Automation. These integrated solutions are based on proven components and guarantee higher productivity at lower operating costs.

In order to ensure the energy and raw materials supply, the percentage of oil and gas output from offshore fields, oil sands, and oil shale will also increase. The exploitation of these resources places high demands on the automation and operation of extraction systems. At the same time, a high degree of standardization is necessary in the system equipment to guarantee safety, environmental protection, and economy of production. One example of Siemens’ capabilities as a complete provider of integrated control technology and safety systems in this field is the modernization of the Oseberg Field Center. See pages 4 to 7 for more details.

I hope this and the other articles in this issue will give you some valuable ideas.

Enjoy the read!

Prof. Michael Bruns
Head of Process Automation
Siemens Automation & Drives
Upgrading to Perfection

One of Norway’s largest offshore oil and gas platform complexes recently received a complete changeover of its control system to Siemens PCS 7 technology, from DISCOS (distributed supervisory control and safety system) to SAS (safety automated system). The work was performed “hot” – all of the main parts were implemented during operation. Siemens successfully completed the project without injuries to personnel and without unscheduled interruption to the oil and gas production – to the customer’s full satisfaction.

Hydro technical manager Gunnar Flakstad said, “When Siemens put in the equipment in the late 1980s it was seen as state-of-the-art. Now technology has moved on, and this is why we decided to implement Simatic PCS 7. It offers greatly improved functionality, especially related to the Human Machine Interface, which is an important aspect closely related to health and safety.”

The complexity of the upgrade

The Oseberg Field Center upgrade has been described as one of the biggest challenges Siemens Oil & Gas has ever undertaken. The center consists of three platforms connected by bridges, with a crew of close to 300 people. Oil and gas production continues 24 hours a day, 365 days a year.

In addition to its own oil and gas production, Oseberg handles production from adjacent offshore fields (Oseberg East, Oseberg South, and Tune satellite field). It also receives oil from the Oseberg C, Brage, Veslefrikk, and Huldra platforms for further export via the Sture onshore terminal. In total, Oseberg handles over 400,000 barrels of oil a day, currently valued at about 25 million euros.

Safety is a major concern. The state of the plant is continuously checked, and if there are unstable or critical conditions, the plant automatically shuts down to a safe state, halting production. With production valued so highly, even a short interruption in production would incur major financial loss.

Replacing 100 separate process and safety automation controllers with about 38,000 I/O points was a challenging task. Oseberg is a live plant that is continuously being modified to adapt to reservoir changes and to optimize the production rates. The changes
in the control system can be anything from adding an extra signal in the system to adding thousands of signals by sub-sea tie-ins of production wells – with corresponding process changes. The control system has to be able to accommodate these changes.

Taking into consideration the complexity of the plant, the extreme quality requirements to perform replacements under full operation, and the critical nature of human safety and production values, the project can only be described as the ultimate challenge.

Expert engineering and close collaboration with the customer was a must

The Hydro slogan for this project was “Focus on quality – zero faults.” Zero-fault execution requires extensive expertise in process engineering, automation engineering, and project engineering, as well as extreme quality in the performance of the engineers, working methodology and systems. At the project’s peak, the team counted 120 Siemens engineers and 30 Hydro engineers. The Siemens team was a mix of personnel from more than 10 different nations, including PCS7 specialists from Siemens in Karlsruhe, Germany.

Close cooperation between Hydro and Siemens was absolutely necessary. Prior to carrying out the project, Hydro and Siemens went through various phases, such as a feasibility study, pilot project, and very detailed main study. Parts of the work required detailed scenario exercises and criticality analyses by Siemens in Karlsruhe along with the customer, to ensure that all aspects of the technology had been evaluated.

Specific requirements for Oseberg presented by the customer and government, such as enhanced alarm handling as a feature in the control system, were addressed in dialogue with the PCS7 system.
development department of Siemens in Karlsruhe. This led to implementation of new features in the PCS 7 core system functionality, to the benefit of both Siemens and Hydro, and to the benefit of PCS 7 users worldwide. Planning phases went on and off for three years prior to the main contract.

Project management put to the test

During the process, 5,750 electrical drawings were produced, 11,000 loop drawings were updated, 250 engineering work packages were produced, and 27 "shelf meters" of documentation were made. To handle the 38,000 hardwired signals, 400,000 electrical connections were made and more than 100,000 meters of cabling were pulled. Existing cabinets were modified and 120 new cabinets were delivered. Siemens’ expert project engineers successfully handled the logistics of the situation, kept track of current status, and performed the necessary criticality analyses and dependencies.

On top of the usual project complexities, 2,000 important changes were made to the control system throughout the project period of four years, due to ongoing modification of the production plant. One could say that updating the control system was like aiming at a moving target. Siemens’ status as a full-service contractor was a great benefit, streamlining the upgrade process and allowing simpler communication and faster execution of changes.

Changeover of the control room HMI was carefully planned and tested onshore before installation offshore, so that the daily work in Oseberg’s control room would not be disturbed. Siemens, in close cooperation with sub-vendor Aibel, delivered the new control room HMI. Aibel was the main contractor for the new control room module. Although much of the control system upgrade work took place during full platform production, Siemens depended on Oseberg’s normal biyearly maintenance periods of about five days each to perform the changeover of critical parts. The safety parts of the plant were installed using fail-safe technology and implementation of Safety Integrity Level (SIL) 1, 2, and 3.

Happy ending

Oseberg now has a state-of-the-art control system with 100 PCS 7 process controllers, an enhanced alarm system, four dual redundant networks, and a complete new central control room with all modern HMI facilities, consisting of six redundant servers, about 20 operator clients, large screens, and a critical access panel (CAP).

The PCS 7 system is designed to meet requirements for the next 15 to 20 years. And integrating the old separate systems into one system simplifies operation, shortens the learning curve for operators, and saves money on spare parts.

Operators are pleased with the results. While testing the new system, operator Tom Eckholdt said: “It is much more modern, offers better visualization tools, and is much more reliable. The new system will make our jobs easier.”

» The new system is much more modern, offers better visualization tools, and is more reliable. It will make our jobs easier. «

Operator Tom Eckholdt

Facts & Figures

- The project involved updating 38,000 hardwired signals in addition to serial signals, all subject to change at any time; 400,000 electrical connections were made and more than 100,000 meters of cabling were pulled
- 120 Siemens engineers preplanned with 30 Hydro engineers for three years before a change was made, and achieved zero faults during a “hot” changeover, with no unscheduled interruption of gas and oil production
- Oseberg produces more than 400,000 barrels of oil and 30 million Sm³ of gas per day, so just one day of lost production would have cost 25 million euros
- Upgrade improvements include an enhanced alarm system, improved HMI (human machine interface) and financial savings through system integration

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Oiltanking Malta Ltd. operates an oil terminal in the south of the Mediterranean island of Malta, directly next to the container and free port in Kalafrana. The capacity of this distribution terminal, built in 1992 and situated close to international shipping lanes, has been expanded in various stages, including the expansion of a fourth tank field in 2006 to create a total storage capacity of 485,000 cubic meters. Distributed over four jetties, different petroleum products can be loaded on and unloaded from tankers of varying sizes, serving markets as far away as the Middle and Far East, as well as North America.

Three operating methods
To ensure long-term availability at this state-of-the-art facility and to minimize service and operating costs, the automation technology for the entire storage facility was migrated from S5 control technology and DOS-based visualization to the Simatic PCS 7 process control system. In addition to operation and monitoring via three operator stations with six 19-inch monitors, the system can still be controlled with illuminated push buttons from the control room.

Facts & Figures
- Simatic PCS 7, Version 6.1
- AS 400F with 417-4H CPU
- Ethernet, Proﬁbus DP, Proﬁbus PA, fail-safe distributed I/O – Simatic ET 200M
- 1,500 I/O devices

The latest generation of PCS7 process control technology ensures long-term availability at an oil terminal in the south of Malta.

Oiltanking Malta Ltd., Malta
Safely Loaded
or via on-site operation. This demanding project was planned and programmed by HIT Hafen- und Industrietechnik GmbH, a Siemens Solution Partner from the city of Wardenburg in northern Germany. Furthermore, at the request of the client, the company also commissioned the system on-site without shutting down the ongoing operation.

The PCS7 system comprises a central engineering system with an operator station (ES/OS), two additional operator stations for operating and monitoring, and the AS 417F automation system. The 417-4H CPU is connected to the PCs in the control room via a CP443-1 communication processor and Industrial Ethernet. At the process level, Profibus DP is used to connect the Simatic ET 200 systems to subsystems, switchgear technology, fire-protection systems, substations, the boiler house, and the jetties. In explosion-hazardous areas, Profibus PA is used to connect pressure gauges. Fiber-optic cables are used for long-distance Profibus communication and are connected to the copper wiring via optical link modules (OLMs).

Comprehensive safety concept

Oiltanking Malta Ltd. also required an integrated safety concept. Master safety functions are carried out in the CPU as a fail-safe program. By using fail-safe components in the field, fail-safe functions such as emergency stop signals can be implemented and added modularly. For servicing and program modifications, HIT can access the system from Wardenburg using an ISDN router.

The visualization system provides users with a comprehensive overview of the complete system. The current status of units such as pumps and motor-actuated valves is indicated by color changes. Important controller information is recorded, processed, and archived, and some information is also displayed in the operator system. Archived data include error and status reports as well as the operating hours and actual current values of the drives.

HIT has successfully completed the project, which included designing a clear, improved user interface and creating an efficient system and software structure. From the outset, the upgraded system and process automation technologies have proven their reliability. Furthermore, system stability and terminal productivity have increased.
Productive Collaboration

Frankfurt-based Lurgi AG has found a partner for the development of new technologies in the chemical process industry. We spoke to Dr. Ludolf Plass, senior vice president of sales technology at Lurgi AG, about this partnership with Siemens.

Dr. Plass, when and how did the intensive collaboration with Siemens develop?

Ludolf Plass: Siemens approached us as a solution provider with technological expertise in the chemical industry in 2003. We were surprised because we had previously known the company only as a product supplier. Siemens received invitation-to-tender documents from us for a methanol project in Australia, and within two weeks we received a complete offer for everything from the energy package, control technology, controllers, and instrumentation to engineering and all the necessary local services. Siemens later built a complete process simulation in Karlsruhe for our Iranian pilot plant for producing propylene from methanol and successfully carried out the factory acceptance test.

What prompted you to consider Siemens as a partner?

Ludolf Plass: We were looking for a suitable partner to develop a customer solution for bioethanol, and Siemens’ transformation from a product supplier into a solution provider suited us well. The company has built up process expertise and offered us a competent and very committed employee as a contact. This employee set up an office at Lurgi AG and worked closely with our staff on the development of a customer solution for bioethanol.

What makes Siemens’ service offerings stand out? What advantages do you have?

Ludolf Plass: Siemens offers customized, tailor-made programs that are based on optimized standards and cover everything from energy and the entire automation technology – including digital control tech-
nology, programmable logic control, network, instrumentation, and drive technology – to planning and engineering. All the local services, coordination of suppliers, training, and after-sales service are also provided by Siemens. The company offers high-quality products at a good price. The company is also globally active and offers complete solutions that reduce interfaces and make things easier for us by taking over administrative work.

Where are the emphases in the partnership?

**Ludolf Plass:** On bioethanol plants and new technologies. The customer contacts that we have found through the excellent Siemens sales network have already been a great help to us in many projects. I think there is a productive symbiosis between the two companies. We have also jointly developed a slide presentation for the acquisition of bioethanol projects, which has proven highly effective. It is a real win-win situation.

**Are there already concrete orders?**

**Ludolf Plass:** Siemens is involved in numerous bids. Some orders for basic engineering that will develop into Siemens orders are already here. Siemens supplies the products for biodiesel orders. These orders are implemented by small and medium-sized partner companies that can provide the engineering and software at a better price. But Siemens, as a provider of complete solutions for large plants all over the world, is the right partner for us.

**And can you tell us something about your plans for future collaboration?**

**Ludolf Plass:** Our Lurgi company in the United States has several bioethanol projects in the pipeline. Siemens was asked to implement the customer solution developed in Germany in the United States too. Negotiations are already in progress.

> **Siemens’ transformation from a product supplier into a solution provider suited us well.**

**Dr. Ludolf Plass,** senior vice president of sales technology at Lurgi AG

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Shell Deutschland Oil GmbH operates a large tank farm for the transshipment and storage of gasoline, diesel, and light heating oil in Kaiserwörthhafen. The products are delivered by pipelines and inland ships, stored, and distributed throughout southwest Germany by the road and rail networks.

Software tracks down energy waste

Thorsten Heins, works manager at the Kaiserwörthhafen site, wanted to examine whether the pump systems of the tank depot were operating optimally or whether there was potential for savings. SinaSave, a new software solution developed in a joint project by Siemens and the Institute for Flow Machines and Fluid Mechanics of the Mechanical Engineering and Process Engineering Faculty of the Technical University of Kaiserslautern, provided the answer to this question. SinaSave can be downloaded from the Siemens website as freeware.

Any company that operates pumps in its processes can use the software to calculate the potential savings that could be achieved if the pump system were to be operated with a frequency converter and the appropriate controller. In Shell’s case, it was proven that the use of frequency converters would pay off within 14 months – a calculation that has since been confirmed in practice, as Heins reports: “We were operating the main pumps for pumping the diesel with the wrong operating point. The surplus energy was dissipated mechanically by slides and valves. We therefore saw it as our obligation to reconsider the processes and
avoid unnecessary energy consumption. We were already reaping the fruits of this decision a year later, with an energy savings of 35,000 euros per year.”

**From theory to practice**

After the convincing result of the calculation, Shell placed the order for the conversion of its pumps to frequency converter operation, a task that was entrusted to the local Siemens system partner Klebs + Hartmann of Ludwigshafen, Germany. After a planning phase of only one month, all the basic data were clarified and implementation of the new concept could begin.

Two Siemens frequency converters of the Micromaster 440 series, with 132 kilowatts of power each, controlled from the control room via Profibus DP and fiber-optic cables, form the heart of the system. The redundant pump system consists of Siemens components throughout: Micromaster frequency converters and motors of the 1LG4 type for the drive technology, Sentron 3VL circuit breakers for the electrical power distribution, Sirius devices for the low-voltage switching technology, Simatic S7 for controlling the automation components, and Beta series built-in devices for the installation technology.

**Lower costs with optimized performance**

The system went into operation at the beginning of April 2006 and has since been saving the company approximately 3,000 euros in electricity costs every month. But the cost savings is only one aspect. The process has also been improved. For example, the pipe network has been relieved of the mechanical impacts that occur in direct network operation of the main pumps. This results in additional savings in maintenance costs and, even more importantly, a considerable increase in system availability.

**Pump drives with frequency converters**

As a rule, pump drives are operated at the nominal operating point of the motors by a star-delta circuit or direct circuit. Surplus energy is dissipated mechanically by slides and valves. This is an ineffective operating mode, but it is still found in more than 80 percent of all pump drive systems today. It can be compared to the driver of an automobile who always drives at full speed and only adapts the speed by braking, and then wonders why his fuel consumption is so high and the brakes wear out so fast.

When operating the motors with frequency converters, the drive receives only as much energy as the process demands. To continue with the example of the automobile driver, he accelerates moderately and brakes only when the traffic situation requires him to.
Nohken, Japan

Effective Elimination

The LDS 6 laser diode spectrometer supports the effective, safe, and environmentally friendly elimination of odorous gases.
Applications in the oil and gas industry are exactly the type of challenge the LDS 6 laser diode process gas analyzer was designed for: sites where high performance and ease of use rank on a par with increased productivity and safety. Those were the requirements of a world-class transshipment and storage facility in Kiire, Japan. The Kiire facility maintains 46 million barrels of crude oil in 57 storage tanks, a supply equal to Japan’s two-week demand. Traditionally, keeping Kiire’s massive containers topped off has required continuous loading and unloading of cavernous bulk oil tankers. This generates odorous gases and results in losses of LPG (liquefied petroleum gas) components into the surrounding environment.

Recently, the terminal operator decided to implement a new tanker vapor recycle (TVR) plant that treats the malodorous vapors exhausted from the hold of a carrier during loading. The plant improves the facility’s environmental profile by ensuring the reliable elimination of malodorous vapors, collecting previously lost LPG constituents, and helping to retrieve the equivalent of 17 million liters of crude oil per year. This project was also one of the first installations of LDS 6 in Japan by Nohken Inc., which recently signed a distribution agreement with Siemens for laser diode spectrometer technology. Nohken believes that the collaborative relationship provides further evidence of its commitment to offer new ideas and improved products that will better meet customers’ needs.

Many challenges

Nohken initially considered Oxymat 6 process analyzers for the Kiire site to determine oxygen. However, with safety demanding a rapid response, an in-situ solution proved preferable, as the analyzer system has to monitor the TVR process for explosion-hazardous conditions in real time. The rugged, reliable, and flexible LDS 6 laser diode spectrometer offered an ideal solution to monitor critical oxygen concentration levels. The LDS 6 is suitable for rapid, non-contact measurements of gas concentrations or temperatures in process or flue gases. The measurement principle of the LDS 6 analyzer is based on the specific light absorption of different gas components, where the laser supports single-line spectroscopy free of interference. Easy to install, the LDS 6 delivers long-term stability resulting from a built-in maintenance-free reference gas cell and does not require field calibration. The measurement can be performed in-situ and delivers real-time values so that explosion-hazardous conditions are detected immediately, triggering a nitrogen flow to ensure plant safety.

With their focus on LDS 6 deployment, Nohken and Siemens assembled an expert team including both experienced staff from Nohken and Siemens analyzer specialists from Germany and Siemens Laser Analytic AB in Sweden. The application required an explosion certificate issued by the Technology Institution of Industrial Safety (TIIS) for the devices, and the team obtained the required documents for the LDS 6 without problems. Additionally, Nohken and Siemens set up an on-site test assembly to demonstrate that the LDS 6 is not affected by the varying hydrocarbon concentrations in the TVR unit, which can reach up to 20 percent. The LDS 6 excelled in these tests, delivering reliable measurements with an error of just 5 percent of read value.

Minimizing the ecological footprint

Nohken and Siemens supplied the entire transshipment terminal with a total of 12 analyzers. All instruments were delivered according to specifications and schedule and are already installed in the Kiire terminal. The TVR facility operates reliably and effectively, making the Kiire terminal more environmentally friendly and more economical at the same time.

Facts & Figures: LDS 6

- Provides rapid, non-contact measurement of gas concentrations or temperatures in process or flue gases
- Accommodates continuous emission monitoring for oil, gas, coal, and other fuels
- Serves up to three measuring points simultaneously
- Connects an in-situ sensor to an analyzer up to 1 kilometer away
- Operates with a minimum of electrical components, is highly selective, and accommodates high dust levels
- Is easy to install, requires little maintenance and no field calibration, and delivers long-term stability

The LDS 6 spectrometer provides a reliable and extremely fast measuring option at the Kiire terminal.
The accurate measurement of liquids is always important, but the measurement of oil and gas products involves a set of unique additional challenges: An oil or gas meter must be capable of underground or underwater operation, work effectively over the long term with no maintenance, and be able to detect leaks and accurately measure a variety of substances.

The introduction of the ultrasonic Sitrans FUS060 transmitter offers the oil and gas industries such a meter for both onshore and offshore distribution. The FUS060 provides not only the highest possible accuracy but also considerable cost savings. In particular, fiscal metering skids, which measure hydro-

**Flowmetering**

**High Accuracy, Low Cost**

Ultrasonic flowmetering is a versatile and competitive technology for hydrocarbon custody-transfer applications.
carbon flow for royalty and duty purposes, can be built at a lower cost when ultrasonic technology is used.

**Benefits of ultrasonic design**

The FUS060 features a range of advanced technologies to optimize efficiency and accuracy and meets international standards for safety and custody transfer, including OIML R-117. Turndown has been improved to 10:1 without compromising accuracy or repeatability.

Installation and operation are simple and user-friendly. Featuring high performance with up to four-track measurement; extended diagnostics; ATEX certification; and analog, relay, or pulse output, as well as Profibus PA or HART fieldbus communication, the versatile FUS060 is suitable for flow measurement in many demanding environments.

**Noninvasive technology**

The FUS060 ultrasonic transmitter is designed to maintain its exceptional custody-transfer accuracy and repeatability for years on end, with virtually no maintenance required. Because the flowmeter does not physically enter the medium, it does not alter the flow properties during measurement and causes little or no pressure drop. The ultrasonic measurement principle is independent of media conductivity, and the technology is therefore ideal for either water or nonconductive media.

If the pipe needs to carry a different substance, the flowmeter accommodates the change effortlessly. The measurement accuracy of the FUS060 is consistently high for a wide range of medium viscosities. This means that one pipe can serve a variety of media, such as crude oil, refined oil products, and petrochemicals.

Ultrasonic flowmeters have no filtration requirements and are much simpler to clean than, for example, turbine alternatives. All in all, ultrasonic flowmeters are simply less complicated to run.

**Less complexity equals lower cost**

The simpler design of the FUS060 transmitter makes it well suited for inclusion on fiscal metering skids. Traditionally, the skids installed on offshore platforms are based on PD (pressure differential) or turbine technology. Ultrasonic technology enables an alternative design that is significantly smaller. For a typical 4,000-cubic-meter skid, the capital cost of the highest-accuracy ultrasonic system is approximately 50 percent and for a generic ultrasonic system is only 30 to 40 percent of the cost of PD or turbine skids. The ultrasonic fiscal metering skid in this example simply requires two ultrasonic flowmeters operating at 100 percent efficiency and installed in series, whereas the PD and turbine-based skids require three flowmeters in parallel streams, each operating at only 50 percent efficiency, followed up by a bidirectional ball prover. It is clear where the ultrasonic skid saves money: initially, in meters of piping, pipe diameter, and quantity of instrumentation, and over the system's lifetime, in increased performance and reduced maintenance costs.

**Designed for evolving requirements**

The FUS060 can be seamlessly integrated into the Simatic PCS 7 process control system. Focused on a systems approach that ensures seamless integration and full compatibility of process control instrumentation, Siemens continues to refine and develop new ultrasonic metering capabilities to meet the evolving demands of the industry – simply making the job easier.
Mr. Fernandez, the price of oil has risen from one high to the next in recent months. How is the chemical industry reacting?

**Miguel Fernandez:** The rising prices are due above all to diminishing resources and increasing demand. Trends for the petrochemical industry can be derived from this. Raw materials must be used optimally in the plants and the running costs optimized. Another important issue is the optimum exploitation of energy. Alternative sources of raw materials, such as oil sands, and alternative transport strategies, such as liquid natural gas, supplement classic transport and logistics solutions. Other major trend areas include alternatives to oil, such as renewable resources. It is obvious that the large oil, gas, and petrochemical companies are examining the possibilities of biological fuels such as bioethanol, biogas, and biodiesel. Companies that originally only transported oil and gas want to bring a greater percentage of the industry’s productivity into their enterprises and are already offering refined products in addition to raw materials; thus, processing is moving closer to the drilling site. Another challenge is the booming Asian industry’s thirst for energy, especially in China and India.

What do these trends mean for your company?

**Miguel Fernandez:** We see the development and use of a number of new alternative bioresources as the way to meet energy requirements. Energy management and the use of energy-efficient systems and plants are becoming increasingly important. Companies are concentrating on their key business or strengthening their position by purchasing new divisions or regional companies. This extends their production scope, improves their market share, or expands their market.

What role do partners and other sales channels such as EPCs play?

**Miguel Fernandez:** It goes without saying that we as a modern provider are familiar with the sales channels and production processes. Our cooperation with...
the EPCs, machine manufacturers, and systems integrators is an integral part of our industry service. We have very good, proven models for this purpose and are expanding this collaboration.

How does the Siemens service offering differ from that of other companies?

Miguel Fernandez: We have a very extensive and well adapted range of products for this industry, with automation, drives, switching technology, process instrumentation, process analytics, and the many other products and systems in our portfolio. But we are not only a system supplier. We can extract the requirements from our understanding of the customer’s processes and then implement solutions based on a value-added concept and with suitable products. This especially is the job of the Chemicals Competence Center. For example, we have developed a tailor-made concept for the rapidly growing polyolefins market that takes the special requirements of the processes into account and supports cost-optimized production.

What are the other challenges in the petrochemical industry?

Miguel Fernandez: Safety, availability, performance, and security of investment – these are important topics in the petrochemical industry that we want to address specifically with our solutions, always with an eye on our customers’ market situation. Consideration of the costs over the entire life cycle of the plant is becoming increasingly important. Operating and maintenance costs as well as expenses and life-cycle considerations – all these aspects are part of the calculation and are often a greater burden than the initial investment. Here, our solutions, with their communication capability, user-friendliness, convenient operating and alarm facilities, and extensive diagnostic and evaluation possibilities, have a great advantage: they support the analysis of consumption data and wear, enabling condition monitoring and proactive maintenance – measures with immediate payoff. Other aspects are, of course, our tools and services for performance screening, process optimization, and Advanced Process Control (APC), which can be used both for plant and process optimization throughout the life cycle. In terms of energy, our consulting and our efficient automation and drive technology contribute to optimum exploitation of resources by our customers – for example, with frequency-controlled drives and energy-saving motors. We also actively promote innovative solutions in other areas.

Mr. Fernandez, thank you for speaking with us.
The main representatives of this group of plastics are polyethylene and polypropylene, which are polymerized from the monomers ethylene and propene under high pressure at high temperature. Both the polymerization conditions and the type of catalyst selected influence the properties of the polymer product. Because the products can be further modified with certain additives, polyolefins are available for an enormously wide range of applications today:

- Fibers and foils
- Plastic bottles
- Packing materials
- Automotive parts
- Pipes

Plastics are all-rounders without which life today would be hard to imagine. The worldwide demand for polyolefins is high and will continue to grow; annual global production is expected to grow from 100 to 165 million tons by 2015.
Because of the coexistence of different production methods and technologies throughout all process stages, every production plant for polyolefins has its own special requirements. However, all process and plant variants have in common that they make very high demands on the automation system and energy distribution. High availability, the greatest possible flexibility, and stable and efficient operation are indispensable. Another task of the process automation system is to organize and control large flows of materials and goods. Because of the highly inflammable raw materials in connection with high process temperatures and pressures, continuous monitoring of the process values and the implementation of safety shut-offs for protection of man, machine, and environment are essential. Electrical equipment must be designed to meet the appropriate explosion-protection regulations.

Automation technology from one mold

Siemens has examined the central challenges of the industry in its Polyolefins Industry Initiative. One of the results is a special portfolio of products and systems based on Totally Integrated Automation (TIA) and Totally Integrated Power (TIP) that offers an optimum solution for automation and drive technology for every step of the polyolefin production process, from preparation of the raw materials to the actual main process, polymerization, to drying and granulation as well as the subsequent storage of the finished plastic granulate.

A tailor-made range of scalable automation solutions from one provider offers significant advantages: smoothly integrated systems can be implemented that also allow package units or existing components to be incorporated. Optimum interaction of all the components, central engineering, and extensive diagnostic facilities result in low life-cycle costs, a high degree of flexibility, optimized logistics, and greater competitiveness. The Siemens polyolefin experts have years of experience in the industry. The worldwide presence of the company and a global service and support network simplify the primarily international project management in the plastics sector, while a sound knowledge of local standards and regulations allows product and service portfolios to be adapted to specific locations. Thanks to this bundling of competencies, project implementation times can be reduced considerably and the security of investment increased.

Portfolio for Polyolefins

- Simatic PCS 7 process control system with integrated model predictive controller for process optimization of the distillation stack or the polymer reactor
- Flexible batch control for granulation with Simatic Batch, including batch management with report generator
- Reliable, robust, and communication-capable process instruments for pressure, temperature, filling level, and flow measurement
- Maxum or MicroSAM process gas chromatograph for analysis of ethylene purity or analysis of the circuit gas (The efficient and compact MicroSAM gas chromatograph can be installed directly at the sampling point and enables drastically reduced cycle times)
- Weighing technology integrated into the control technology for weighing the plastic pellets in outgoing goods
- Integrated fail-safe system for safe shutdown of the polymer reactor, also for short response times (e.g., for the LDPE high-pressure process)
- Advanced Process Control (APC) for process control and optimization, also with modeling and simulation approaches
- Totally Integrated Power (TIP) for a reliable and highly available power supply with manageable maintenance costs
- Simocode motor controllers for intelligent pump diagnosis in the control technology
- Scalable drives and motors, from energy-saving motors and explosion-protected motors to standard drives and large frequency-controlled drives for the extruder

Siemens offers a portfolio of products and solutions specifically adapted for polyolefin production.
Process gas chromatography

Parallel Analysis

The Maxum II gas chromatograph enables simultaneous determination of up to 24 gasoline components for the very first time in a single device.

Two parallel measuring lines in a double furnace at different temperatures are used for this difficult analysis task. Even the highly complex separation of 2-methylpentane and 2,3-dimethylbutane can be performed successfully. This innovative solution is unique worldwide and is based on the use of two different capillary column types in which the individual chromatographic separations can be optimized by a special flow-back valve. It also features extremely low maintenance requirements. This solution enables simple, rapid, and comprehensive gasoline analysis in just 15 minutes.

Ceres Grain Mills, Belgium

High Quality, Low Costs

Ceres, the largest grain-processing company in Belgium, has gradually automated its entire production process. The result is an integrated solution that ensures transparency and keeps costs manageable.

The entire process, from the delivery of the grain to dispatching the flour, is now tracked by PCS 7 linked to the Simatic IT-based manufacturing execution system (MES). In addition to the process control itself, PCS 7 also provides information for targeted preventive maintenance based on the actual condition of the individual components. The entire plant was also designed for minimum energy consumption. The mills, for example, run only when they contain grain, and transport pipes are switched off automatically when there is no need for transport.

Not only productivity but also product quality has improved noticeably since the automation.
Reliance Petroleum, India
Single-Source Solution

Reliance Industries Limited, the largest private company in India, recently used Siemens to expand its Jamnagar oil refinery in Gujarat with a new gas chromatography system and analyzer management system (AMS), as part of a plan to double plant capacity by April 2008. The expansion called for 31 additional gas chromatographs (GCs) plus a networking solution for all 221 analyzers in the plant.

Siemens was able to present a convincing solution for both GCs and an AMS. Simatic WinCC is used as the uniform interface and front end for the AMS. Reliance was very satisfied with the results of the factory acceptance test. Despite frequent changes and additions to the RFQ (request for quote), the GCs and AMS were delivered on time and as requested.

TU Weihenstephan, Germany
MES for Bottling

The department of food packaging technology at the Munich-Weihenstephan Technical University configured a commercially available manufacturing execution system (MES) for use in bottling and linked it to a pilot system in the food technology laboratory.

For that purpose, the project team developed a standard library for the modular MES Simatic IT. This library is the foundation for engineering the bottling process.

Using this library, Simatic IT can be easily used in projects for bottling. The result of the configuration has already been presented at the Drinktec 2005 trade fair. It was demonstrated that the Weihenstephan standards permit a decisive improvement of the data quality, even for the wider IT infrastructure, and clearly simplify the implementation of similar systems. The use of the library results in much lower costs for bottling companies.

The system will be used in the future in the department of food packaging at teaching events and for the preparation of theses in the technology laboratory pilot rotary plant.
Lenzing (Nanjing) Fibers Co. Ltd. inaugurated a new viscose fiber plant in Nanjing, China, in April 2007. Simatic PCS 7 ensures that the entire production process runs reliably.

**Swiss Expertise at Work in China**

**Bhend Automation AG**

Founded in 1980, the company develops customized solutions in the field of automation for process technology, environmental technology, and other process techniques. In China, the company has been partnering since 1993 with a local provider specializing primarily in controller construction.
The new plant has an annual nominal capacity of 60,000 tons of viscose fibers. The process automation system was implemented by Bhend Automation AG, of Unterseen, Switzerland. The company’s expertise, both in the automation of fiber production processes and in the Chinese market, was critical, as Max Bhend, owner of Bhend Automation, confirms: “Knowledge of the Asian culture is an important tool for anyone who wants to operate in China.”

Bhend was active in China as early as 1984 in connection with a project for the manufacture of viscose fibers and has since continuously expanded the company’s activities there, with an emphasis on process control in viscose fiber production. Repeated contact with the world’s leading manufacturer of viscose fibers, Lenzing, an Austrian company, led to Bhend Automation being asked to engineer the process control for a new production system. Bhend explains: “We made a bid against competition from local companies and won the contract. The price was not the customer’s main concern. It was our great technical expertise that was decisive. We have been successful as a small Swiss company in the Chinese market for more than 20 years and are considered practically as a local provider.”

Reliability as a priority

Bhend Automation chose the Simatic PCS 7 process control system, in agreement with the customer. Bhend explains: “Both the mechanical equipment and the control system must operate absolutely reliably.” The raw material, cellulose, comes from wood fibers and cotton waste that is liquefied in a chemical process and spun into fibers. As a natural product, viscose matures quickly; it can then no longer be processed and must be disposed of, which incurs extremely high costs in addition to the considerable operational losses. “PCS 7 is a proven, widely distributed process control system,” says Bhend. “This gives us great security because we have networked approximately 20 PCs here and use about 6,000 I/O.”

Standard components and functions

In agreement with the customer, the control planners dispensed with specially programmed components. “We basically use the components and functions offered by PCS 7. We have never reached any limitations yet,” says Bhend. The customer’s employees were involved in the development of the process control system from the start, which ensures that the system is maintained by well-trained personnel.

To test the programmed processes, Bhend Automation uses Simit software for the dynamic simulation of whole systems in Unterseen and in China. “We use this tool on all the controllers that we program,” explains Bhend.

All the information is displayed on the screen in English. “As much as possible is displayed graphically so that the operator does not have to pay too much attention to text,” says Bhend. “The process control is also a big help here.” Great importance is attached to the event log that documents all interventions, changes, and faults.

Bhend Automation’s choice has been confirmed, as Bhend explains: “Current experience shows that we were right. The system runs very stably.”

Facts & Figures

- Process control based on Simatic PCS 7
- Approximately 6,000 I/O
- 20 PCs for control and monitoring
- Simit Simulation for simulating process behavior ensures the correct functioning of the PCS 7 process control system in every project phase
- Maximizes planning security and on-time delivery
- Minimizes costs and risks
Whether it’s a question of controlling the material flow through a transport system or feeding process media through a pipe network, the Simatic Route Control (RC) option package for Simatic PCS 7 covers everything from manual material transfer and batch operation to smooth integration into an automatic process control system.

**Configuration instead of programming**

Simatic Route Control does not have to be reprogrammed for every change but is based directly on the configuration of the Simatic PCS 7 process control system. The configuration of continuous function chart (CFC) plans, route modules, or sequential function chart (SFC) step chains for controlling these components takes place within the PCS 7 engineering environment. The configuration of subordinate route sections and the connection of the individual process elements, in contrast, takes place via the RC configuration interface.

Here, it is significant that the configuration is performed by parameterization and not by programming. This not only leads to much clearer configuration but also reduces the probability of input errors. Changes – for example, in the course of a system conversion – can be easily made at any time. An extensive offline test mode also offers the possibility of checking which routes and elements have been identified and whether the configuration is correct prior to implementation.

**Easy operation**

In addition to the configuration environment, the RC package also contains the RC server, HMI components (component symbol, image component, RC Center, and RC route protocol display), and above all an extensive library with interface modules for the most common process elements, such as motors, pumps, valves, and sensors, plus, of course, the route component as a central interface to the user program. Precircuited sample plans simplify configuration. Numerous wizards support the user – for example, in the configuration of mass data or the configuration of communication links.
The transfer at runtime usually takes place in different stages (initial position, ensuring that the side valves are closed, opening of the transfer valves, opening of the valve at the source, material transfer). RC offers more than 30 freely definable function steps that can be grouped into so-called function catalogs. The RC Center, as an interface for the operating personnel, clearly shows the list of selected subroutes, the activation of the route elements, and their feedback status. Detailed information is also displayed in the event of a fault, when, for example, follow-up materials are not allowed or elements do not adopt the necessary position in a reasonable amount of time.

**Safe transfer**

With Simatic Route Control, users have a package with which they can efficiently configure, execute, log, and diagnose material transports in systems. RC finds the most suitable path independently and automatically, even in highly complex route networks with many possible routes, and controls the implemented elements reliably to transport the material from source to destination.

**Facts & Figures**

- More than 30 controllers with more than 1,000 control elements (motors, valves, pumps) each; 1,024 sensors
- More than 1,000 connecting elements (which represent the material in a section)
- More than 1,000 parameter elements (set-point specification, e.g., flow volume, weighing volume)
- Up to 300 material transfers can take place simultaneously; routes or their elements can be distributed via several automation systems (typically 5–6)
- A route request takes approximately 5 to 10 seconds, 30 seconds maximum, depending on the complexity of the route network (user component – route component interface).
- Changes in the configuration can be downloaded during operation
- Availability is increased by redundantly designed RC servers, use of Simatic S7 H controllers, and a redundant system network between the RC servers and the automation systems

With the Simatic Route Control option package, Simatic PCS7 can automate not only the production processes and corresponding stores but also the material transports between them.
National Starch and Chemical Company produces flexible moisture-resistant and crack-resistant adhesive resins found in the microchips used in PDAs, laptops, and other electronic equipment all over the world. The company worked with Siemens on a staged upgrade of its organic chemicals plant and the construction of a new facility. “Reliability is our highest priority. Our customers depend on it,” said Jeff Mueller, National Starch’s engineering manager. “Unplanned shutdowns quickly add up to millions in losses.”

In 2002, Mueller developed a staged manufacturing control technology road map. Together with Control Corporation of America (CCA) and WESCO Process Automation, National Starch created an evaluation matrix listing and ranking nine selection criteria. Three process automation vendors were ranked based on the matrix. “As the vendors gave their presentations, we filled in the matrix. The Simatic PCS 7 distributed control system gave us the best system,” Mueller said.

Phased modernization helps National Starch halve cycle time with Simatic PCS 7 process control technology.

The existing control system operated with different versions of software and hardware. Implementing the new control system required getting the existing system to a common stage before migration, to minimize the risk of disrupting production. A consistent plan was followed across all reactors. Stage 1 of the road map, creating a uniform control architecture by upgrading two existing 435 PLCs to Simatic S5 controllers, was carried out in 2003. Stage 2, in 2004, added a new reactor train. “We needed experience working with PCS 7 and the Profibus communications network to connect with measurement and control devices. Starting on a low-risk project, we could implement programming blocks as a template for future systems and as a stepping-stone to batch recipe management,” Mueller said. The Simatic PCS 7 solution that was installed uses a redundant Simatic 400H automation system and PCS 7 operator stations connected via Ethernet throughout the plant. Stage 3, migrating from the existing controllers to Simatic PCS 7 on one of the existing reactor trains and a pan dryer, took place in 2005.
Fieldbus benefits

National Starch maximized its investments by keeping its field instrumentation and existing I/O modules as part of the migration to PCS 7. The openness of Profinet PA allowed the company to retain the instrumentation standards from its existing vendors. In addition, standardizing on Profinet to connect both legacy controllers and the Simatic PCS 7 automation systems saved on traditional wiring.

Safety precautions were paramount. “Siemens has hardware with built-in safety capability that uses very low current,” Mueller said. “Profinet PA and the Simatic ET 200iS distributed I/O devices are both designed for intrinsically safe areas and applications in electrically hazardous locations. That saves us time and money.”

Expansion and new build

With all three implementation stages complete, work on the new EMAnate organics plant adjacent to the existing facility began in 2005 and came online in 2006.

The cornerstone of the new plant is the Totally Integrated Automation platform that incorporates the Simatic PCS 7 process control system, including batch control software, and Profinet communication networks.

The plant has two control rooms that are each equipped with a PCS 7 automation system, connected to each other by fiber-optic cable. Manufacturing can switch control of each facility between locations. The new plant includes the full line of Siemens electrical system components, including switchgear, motor control centers, variable-frequency drives, breaker panels, wire and cable, instruments, and control valves.

Improvements over previous operations

Another reactor train was brought online early in 2007. Mueller said the first EMAnate qualification batches hit the predicted cycle time marks – a vast improvement over previous operations. “We are looking at reducing our production time by 50 percent compared to the existing original plant,” Mueller said. “Also, we are anticipating significant improvements in product quality. It is beneficial to be able to go to one supplier for the entire automation line and know that it is all going to work together.”

Evaluation Criteria

- Cost
- Overall capability
- Operator friendliness
- Programmer friendliness
- Open communications standards
- TI 505 legacy control platform hardware utilization
- TI 505 program conversion/reuse
- Installed base/presence within ICI (the parent company)
- Batch recipe capabilities

» Reliability is our highest priority. Our customers depend on it. «

Jeff Mueller, engineering manager at National Starch

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Sasol, Germany

A Successful Initiative

Sasol equipped a plant on the Marl Chemical Estate with Simatic PCS 7. The project was the first in a series of modernizations with PCS 7.

Sasol Germany – the German branch of the internationally active Sasol oil, gas, and petrochemical company, headquartered in Johannesburg, South Africa – operates production plants on the Marl Chemical Estate for the manufacture of preliminary products for the washing and cleaning industry. Sasol Germany, headquartered in Hamburg, employs about 1,600 people and also runs factories in Brunsbüttel and Witten in addition to Marl.

Marl is the largest Sasol site in Germany, with approximately 750 employees. The primary products manufactured at the Marl factory are tensides for...
Modernization of the control technology

The plant for high-pressure hydrogenization (HD plant) was to be equipped with a modern process control system in the course of ongoing improvements. Parallel to this project, the safety concept of the plant would also be updated. Sasol placed great emphasis on uniform operation and visualization, with which the analysis of shutdowns of the safety technology would be simplified and thus the overall safety increased. The system engineering was also to be combined at a central point.

Following extensive product comparisons, Sasol chose to modernize the plant in Marl with Simatic PCS7. The control system provided an important foundation, especially in terms of an integrated solution for safety technology and the linking of distributed control rooms and devices via a distributed periphery. Another key benefit was that engineering services are always readily available for PCS7 due to the wide distribution and acceptance of the Siemens technology.

Implementation during ongoing operation

The modernization project began in February 2002. The unique challenge was that the new systems for eight high-pressure reactors, two tank depots, and exhaust gas combustion were to be installed and commissioned without additional downtime during operation and regular revision periods. At the same time, the entire plant would be equipped with new instrumentation.

Siemens took over the project management and the engineering, including factory and site acceptance tests for the process control system. In addition, Siemens also supported the customer in the start-up of the control system and took over the switch cabinet construction, standby service, on-site training, and training for the maintenance personnel. The new Simatic PCS7 control system consists of two redundant OS servers, one engineering station, and five OS clients. The system is linked to the office network with an MIS (manufacturing information system) Light client via a firewall.

The system sections are divided among the three highly available and fail-safe AS 417 FH automation systems, and a tank depot is also linked to the control in production sections 1 and 3. The controllers are networked with each other and with the servers via a system bus (Fast Industrial Ethernet). The peripheral systems, including Simocode motor controllers and frequency converters as well as an S7-300 for controlling the filling, are linked via redundant Profibus DP, partly using fiber-optic cable.

Successful completion

The project was finished on schedule at the end of 2005. With PCS7, Sasol benefits from enhanced safety and system availability through redundancy up to the link with the I/O level. The start-up processes can also be automated by relatively simple means. Production was also increased through improved process visibility, as distances from limits can be reduced. And with respect to other process parameters, the new control system allows optimization of processes and supports faster elimination of faults through extensive diagnostic facilities.

The project was completed with the later integration of the fatty alcohol distillation facility in the measuring station of the HD plant.
Hochwald Nahrungsmittel-Werke GmbH in Polling, Germany, mapped out the route for worldwide success years ago with its high-quality Bärenmarke, Glücksklee, and various export products.

Approximately 180 people are employed at the Weiding factory in southern Germany, which turns about 200 million liters of milk per year into condensed milk, milk-powder specialties, and fresh products. Most of the condensed milk is intended for export and is filled into 80-, 170-, 340-, and 410-gram cans on five production lines. The cans are then packed in boxes in one, two, or four layers and are transported to the central box station on a common conveyor line. There the boxes must be sorted again on five delay lines before palleting. This requires clear identification of the individual containers.

Initially, this identification was performed by two light barriers arranged one after the other, based on the different heights or lengths of the boxes. However, with the growing variety – approximately 100 different variants in 18 sizes at the latest count – it became increasingly difficult to sort the boxes by their dimensions alone. "In order to still be able to
achieve reliable distribution of the boxes to the correct delay line without the need for manual intervention, we were looking for a system that would be easy to set up and reasonably priced and that could also detect the boxes ‘on the fly’ by their color,” explains Markus Werkstetter, head of electrical engineering at Hochwald in Polling.

**Simple, compact, and low-cost**

After comparing several alternatives, Hochwald chose the Simatic MV220 vision sensor. The innovative color-area sensor is the synthesis of highly efficient image processing technology and simple, compact sensor technology. It is designed with IP65 protection and is therefore suitable for use in the harsh industrial environment.

All the elements necessary to easily test distinguishing color characteristics are accommodated in a compact housing: first, an image sensor with a CMOS chip for color evaluation of images with a resolution of 640 by 480 pixels and a continuously adjustable lens with a variable image field at object distances of 50 to 250 millimeters, plus white LEDs, a laser-based alignment tool, and a simple operating and indicating unit with keys, display, and LED indicators. The integrated digital inputs and outputs are fed via M12 connections, as is the power supply. The vision sensor can “learn” and save up to 16 different test models and reliably detect them on both stationary and moving objects automatically.

**Color detection without extensive programming**

The necessary manual alignment of the system is supported by two laser points projected into the image window. Enclosed templates assist the user with the menu-guided adjustment of the sensor to the appropriate ambient conditions. The learning of testing tasks is then reduced to the presentation of one or more objects to be detected. Test operation can begin as soon as the sensor has learned the models.

Hochwald uses the “matching” test type at an average test density of 64 colors to detect a box color or a logo printed on the box – 16 and 2,048 colors are also possible. The particular color pattern to be detected is specified to the device by the master control via the digital inputs.

“At the moment, detecting a single color pattern and linking the result to the following geometry scan is totally sufficient for our purposes,” says Werkstetter. From this information, the Simatic S7-300 master controller with a 315-2 DP CPU can determine the form and color clearly and accurately, and by this means determine the destination of the box.

The link to the Simatic controller is achieved locally by Profibus, via the digital inputs and outputs of the vision sensor and the Simatic ET 200 distributed I/O devices. A Simatic TP 170B Touch Panel serves as a local HMI for the box station.

**Enough capacity even for new jobs**

Hochwald plans to network the independent control systems of the filling plants and the box station with each other in the future to make the processes even more transparent. Until then, the boxes are being checked on the fly, which means the exact time of the detection is triggered by a digital input. Each of the five supplying production lines has a capacity of 5 to 12 boxes per minute. This gives a potential total yield of one box per second. Intelligent production planning ensures that as few identically shaped and identically colored boxes as possible are used, and 40 boxes at the most run through the station detector per minute. The MV220 sensor can process up to 30 images per second, so the system has ample capacity reserves.

Shunting with the vision sensor has proven to be a good choice at Hochwald: “The functionality of the MV220 is tailor-made for our requirements, and the operation is simple and straightforward. No special knowledge is necessary to get the device running. All in all, the price/performance ratio is just right,” concludes Werkstetter.
Automotive symposium with BASF and Siemens

Ideas for the World of Tomorrow

Representatives of BASF and Siemens met in July this year in the newly opened visitors’ center of BASF AG in Ludwigshafen, Germany. The motivation for the workshop came from BASF’s and Siemens’ desire to talk about future materials and production technologies and to discuss new areas of cooperation beyond the classic customer-supplier relationship. The emphasis was on how to create a benefit for end customers of both companies, such as those in the automotive industry.

Both companies are global trendsetters in their respective branches of industry. “The symposium gave us a good opportunity to talk about fields of innovation outside the normal daily routine. We found this extremely valuable,” said Dr. Willy Hoven-Nievelstein, group vice president, Engineering Plastics Europe, BASF AG.

www.siemens.com/chemicals

New trace oxygen analyzer Oxymat 64

Sense and Sensitivity

Air separation plants, production of technical gases, welding in a protective atmosphere – these are just a few examples of applications in which Oxymat 64 reliably detects small traces of oxygen.

The open interface architecture of the Series 6 (RS 232, RS 485, Profibus) enables easy access to information for maintenance purposes and for remote control and operation.

Oxymat 64 uses a tubular ZrO₂ sensor and is available with either a catalytic inactive ZrO₂ sensor or a catalytic active ZrO₂ sensor, depending on the application.

www.siemens.com/processanalytics

Robust and Reliable

Calomat 62 applies thermal conductivity detection (TCD) principles and is specially designed for applications in corrosive gases such as chlorine. Areas of application include chlorine-alkaline electrolysis, steel mills and steel treatment, LNG (liquefied natural gas) plants, ammonia plants, and fertilizer plants. The device features the open interface architecture of the Series 6 and a universally applicable hardware base including a flushable IP65 field unit with gastight separation of the electronics and measuring cell.

www.siemens.com/processanalytics

Calomat 62 analyzes gases with corrosive ingredients

Forum for ideas (from left to right): Anton S. Huber, group vice president, Automation & Drives, Siemens AG, in conversation with Dr. Willy Hoven-Nievelstein, group vice president, Engineering Plastics Europe, BASF AG, and Dr. Stefan Arenz, Elastogran GmbH
Do you want to know more about the systems and solutions for the process industry from Siemens Automation and Drives? Simply visit our information portal on the Internet at

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Automating with PROFINET

Raimond Pigan, Mark Metter

Profinet, the first integrated Industrial Ethernet standard for automation, utilizes the advantages of Ethernet and TCP/IP for open communication from the corporate management level to the process level. This book serves as an introduction to Profinet technology and describes the industrial network technology, including active network components, cables, and connection systems, together with recommendations for installation.

Automating with PROFINET; 2006, 355 pages, 207 illustrations, 156 tables, hardcover
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