Benefits of MES: Interview with Dr. Horst J. Kayser

Simatic PCS 7 and Simatic IT at RohMax Öl Additive

Danone integrates production and ERP level Information Backbone
By integrating two filling lines using Simatic IT, Danone Spain could achieve significant process improvements: higher availability, better quality management and better compliance with regulatory requirements.

The German company RohMax Öl Additive exploits the benefits of Simatic PCS 7 to produce tailor-made additives for industrial, automotive and aerospace applications.

Offshore challenge: Siemens is currently migrating a Teleperm M system to Simatic PCS 7 for Norsk Hydro.

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Siemens equips new AMD chip factory.

Process Instrumentation and Analytics Promotion Truck “on Tour”.

LuoYang Float Glass and Siemens sign cooperation agreement.

MicroSAM wins IF design award.

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Upgrading the Oseberg Field Centre to Simatic PCS 7.
Dear Readers,

Our customers demand solution expertise, open systems and concepts, and a global presence from us – that is the result of a poll conducted among well-known industrial companies by Morgan Stanley on the subject of automation technology.

“We always knew that”, we from Siemens could say, and in fact the study confirms our excellent position as one of the leading solution providers for industrial automation, with good industry knowledge and a remarkable global presence.

However, we still consider our strengths to be in innovative, high-performance, technically superior products. We have made use of this strong, healthy foundation to consistently build up and expand our solution expertise in recent years and to offer our customers more than “just” an integrated technology and product range.

In this issue of Process News you will find some examples of this approach – such as the modernization of the process control technology at RohMax Öl Additive.

The Morgan Stanley study also confirms our strategy in this respect: Total cost of ownership and life-cycle costs are much more important than the mere initial investment in a new automation or IT solution. Therefore, flexibility, scalability, and openness are very important factors – particularly in the market for manufacturing execution systems (MES), on which this issue focuses. Our solution is called Simatic IT. Simatic IT is the only MES software developed and implemented consistently according to the S95 regulation. Simatic IT is based on open, standardized interfaces, is structured modularly with the central workflow as a production process model, and offers optimum integration through Totally Integrated Automation. You can read what Simatic IT can really do and how you as a user can benefit from that from page 6 onward.

I hope we will give you a few valuable tips.

Dr. Horst J. Kayser
Head of Industrial Automation Systems
Siemens supplies automation and electrical equipment for new stainless steel works in Shanghai

Siemens has received an order from the Chinese company, Baoshan Iron & Steel Group Co. Ltd. (Baosteel), to supply all the automation and electrical equipment for the second production line of the Shanghai No. 1 stainless steel works. With an order volume of around 19 million Euros, the new stainless steel line is to start operating in September 2005 and will consist of a scrap yard, a 90 MVA electric arc furnace with a tapping weight of up to 120 metric tons, an argon-oxygen decarbonization converter with a capacity of 135 metric tons, a 135 metric ton ladle furnace and a continuous casting plant.

For these facilities, Siemens is delivering all the electrical equipment, including instrumentation and drive technology, as well as a dynamic reactive-current compensation system. Moreover, the new production line will also be provided with a process control system based on the Simatic PCS 7, with integrated technological functions for the continuous casting plant. Siemens is also responsible for the engineering as well as for monitoring the installation work and commissioning.

Find out more:
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Siemens equips new AMD chip factory

Siemens has been commissioned by M+W Zander, Stuttgart, to equip the second AMD factory in Dresden, the Fab 36 for production of AMD64 microprocessors, with building and process automation. The work contracted to Siemens comprises building and process automation for all buildings and plants from the planning phase through complete construction to commissioning work – including technical building equipment and process supply for the 14,500 square meter clean room. The construction phase of the 2.4 billion Euro project began with the groundbreaking ceremony on 20 November 2003. "Ready for equipment" is scheduled for the end of 2004.

Siemens will be in charge of project handling within the scope of the contract from M+W Zander. This includes complete project management and execution planning as well as field instrumentation, installation and application programming. The Simatic PCS 7 process control system will be used as a plant-wide system platform for all building and process automation tasks – from the clean room to auxiliary systems such as high-purity water, waste water, chemical supply and technical gases.

Find out more:
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Process Instrumentation and Analytics Promotion Truck “on Tour”

Agile and fast with short startup times – these are the key features of the promotion truck for process instrumentation and analytics that is currently on tour in eastern Germany. The truck covers the entire spectrum of Siemens solutions for process control, instrumentation and analytics, focusing on new technologies such as radar and ultrasonic devices for level monitoring as well as flow meters using the Coriolis effect or the ultra-compact process gas chromatograph MicroSAM.

Find out more:
www.siemens.com/processinstrumentation
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On tour in Europe: Process Instrumentation and Analytics Promotion Truck

The truck is nearly fully booked right through to November 2005. After touring through southern Germany, it is heading for Great Britain and Switzerland, continuing its tour in northern Germany in the fall and visiting customers in Austria and western Germany in Spring 2005. After that, it is heading east again, to Poland and the Czech Republic before visiting the Netherlands, France and Spain.
LuoYang Float Glass and Siemens sign cooperation agreement

From April 11 to April 14, Beijing International Exhibition Center was home to the fifteenth International Glass Exhibition. More than 2,100 companies attended the exhibition and 40 percent were from foreign companies, illustrating the growing global significance of the Chinese glass industry. China is becoming one of the most important glass-producing centers with one of the most rapid growth rates worldwide. Siemens Ltd. China showed the latest Simatic PCS 7 technology including the newly launched Simatic PCS 7 Box as well as motion control products, and Siemens Shanghai Industrial Automation Ltd. showed its solutions for the glass industry.

During the exhibition, Siemens and the China LuoYang Float Glass Group held an Advanced System Integrator cooperating signature ceremony. China LuoYang Float Glass Group was founded in 1956, and after more than forty years development, it has become a huge enterprise group containing technology development, producing and marketing, import and export trade, finance and stock business. The company has developed the LuoYang Float process, one of the three main float glass techniques, and is China’s top float glass manufacturing company.

The president Mr. Liu Baoying and general manager Dr. Zhu Leibo of China LuoYang Float Glass Group expect that with the signature, Siemens and China LuoYang Float Glass Group will both venture into a fruitful cooperation that will provide a good platform for future projects.

Find out more:
www.siemens.com/glass-industry
e-mail: glass.team@siemens.com

MicroSAM wins iF design award

Siemens automation and drive products were awarded no less than six of the renowned design awards. The Sinamics S120 and Sinamics G110 frequency converters, the head module of the distributed device Simatic ET 200X, the Vision System Simatic VS120 and the machine control panel of the Sinumerik 840D impressed with their outstanding fusion of functionality and design. The MicroSAM process gas chromatograph was the winner of the sixth award demonstrating that good looks and a clever interior do indeed go together well.

The iF design award is the internationally most acclaimed German design award. It is awarded annually by a jury of international experts during the CeBit tradeshow and Hanover Fair. The prize-winning products were on show both at the CeBit and Hanover Industry Fair this year in the iF pavilion at the exhibition center.
Shortened product lifecycles, increased product variety, changing regulatory requirements, squeezed profit margins, and global markets continually present manufacturers with new and complex challenges. Moreover, manufacturing has become a cross-plant, cross-country, cross-enterprise process involving the entire supply chain.

To remain competitive, manufacturers need to simultaneously reduce time to market; increase process visibility and production flexibility; optimize forecasting and scheduling; and reduce rejects, stocks, and downtime – all while ensuring optimal quality and production efficiency across global facilities.

Meeting these goals requires an integrated IT infrastructure that helps coordinate production on a global scale and, if necessary, in real time. This optimized coordination must cover such things as specifications, equipment, facilities, processes and procedures, quality tests, and personnel resources.

Current IT infrastructures, however, are typically not able to effectively accommodate such levels of integration. There is an information and functionality gap between the business processes run by ERP systems and the automation of production processes and equipment.

The objectives and capabilities of business systems are different from those of control systems, yet there is a fundamental need for them to work in synchronization with each other. Any distortion leads to inefficient operations, higher costs, and lower quality, which ultimately translates into lower profits. Therefore, ensuring tight integration, perfect communication, and efficient coordination between these systems is vital.

Manufacturing Execution Systems: What they do and how they work

Full Potential

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MES Glossary

**Electronic Signature**: Electronic proof that a person performed an action; part of the permanent electronic batch record (EBR) and required by several regulatory bodies.

**Genealogy**: Element of tracking and tracing defining a product’s family tree.

**KPI (Key Performance Indicator)**: value calculated from process and equipment data (e.g., equipment efficiency)

**Library**: Collection of partial models saved for later reuse.

**Object Oriented**: Programming methodology allowing for simple reuse of programmed or modeled functionality (objects) in other projects or programs.

**Production Operations**: Executable workflows of business and production logic.

**Tracking and Tracing**: The complete manufacturing history of a product, stored for performance analysis and regulatory purposes.

### Linking business and control systems

A new family of software – manufacturing execution systems (MES) – has emerged, which provides effective integration of production processes and enterprise business systems. Manufacturing execution systems not only provide a layer of communication between business and control, they also represent a set of coordinated functions capable of optimizing plant activity during all phases of production.

An MES solution usually includes support for the following functions: resource management and resource allocation, dispatching, data collection and acquisition, quality assurance management, maintenance management, performance analysis, scheduling, document control, and labor management, as well as material and production tracking.

### ISA-95: An international de facto standard

International organizations have established a clear definition of MES functionality and have developed models that describe and standardize MES systems. The ANSI/ISA S95 – ISA-95 for short – international standard defines terminology and models used in the integration of MES systems and has achieved broad industry acceptance. The first two parts of the standard have already been published, and the final part is currently under development by the ISA SP95 committee.

A typical MES environment helps manufacturers to answer critical production questions: How to produce? What can be produced? Where and when must it be produced? What was produced and when?

These questions have a direct and immediate counterpart in terms of ISA-95 modeling. Product definition, production capability, production scheduling, and production performance represent the fundamental business processes to create the link between control and business systems.

Essentially, ISA-95 defines the critical modules required for the development of an effective MES system: software functions, a physical model of production capabilities, and the corresponding business and production processes.

### Simatic IT and ISA-95

The functionality and architecture of Siemens’ MES offering, Simatic IT Framework and Components, are fully compliant with ISA-95.

Each Simatic IT component is dedicated to a specific task, which corresponds to one ISA-95 software function. Together they cover all standard production functions required by ISA-95.

The Simatic IT Framework provides an object-oriented methodology to model the physical plant and all equipment constraints. This physical model allows for a clear, well-structured, and self-documenting approach during the analysis phase of an MES project. Due to their object-oriented nature, these physical models are highly reusable and therefore reduce rollout and maintenance costs.

Simatic IT Framework offers a graphical environment allowing for intuitive business and production process modeling. The resulting workflows (production operations) define the behavior of the plant and coordinate all manufacturing-related software and equipment functions. This dramatically increases the flexibility, responsiveness, and transparency of the system. Again, these workflows are easily reusable, reducing risk, cost, and duration of solution development, rollout, and maintenance.

Find out more: www.siemens.com/simatic-it

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### S95 at a Glance

The international standard ANSI/ISA S95 consists of three parts:

**Part 1**, “Models and Terminology,” was published in 2000 and provides basic models and the terminologies needed to define the interfaces between a company’s business processes and the process and production control systems.

**Part 2**, “Object Model Attributes,” was published in 2001. This part defines, in conjunction with part 1, the interface content between manufacturing control functions and other enterprise functions.

**Part 3**, “Models of Manufacturing Operations,” is still under development. Closely related to parts 1 and 2 of the S95 standard, part 3 will provide detailed definitions of the main activities of production, maintenance, inventory, and quality control.
## MES Business Benefits

MES attacks a number of easy cost reduction targets. Those reported most frequently as measures used for project justification are shown in the illustration.

Classical targets for cost reduction – inventory measures, quality, and labor costs – were cited by most respondents as the measures by which their projects were justified.

Customer service was a key performance improvement target for the high-volume low-margin manufacturers that we interviewed, which focus on managing late order and partial shipment situations. Though the dollar value was not quantified, one manufacturer reported, “suffice it to say that customer irritation means lost revenue.”

### Targeting Costs

As part of ongoing research into the performance of manufacturing IT investments, AMR Research recently interviewed manufacturers across various industry verticals about the kind of ROI that they were seeing from their Manufacturing Execution System (MES). Across the board, we found that MES paid for itself on traditional cost reduction measures within 6 to 24 months of going live.

Reducing the cost of regulatory compliance was a concern almost exclusively limited to medical device manufacturers and food/pharmaceutical manufacturers. For one medical products manufacturer, the integration of MES into weigh/mix operations has eliminated 1.5 million manual entries per year. This same manufacturer has achieved a phenomenal 15 to 1 reduction in the time required to handle a batch exception, on top of a substantial reduction in the total number of exceptions.

Another major player in the pharmaceutical arena anticipates combined savings of at least $3M per year across a number of facilities through a 50% reduction in batches discarded because of processing problems and human error.

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<th>Improvement Area</th>
<th>Percentage of Responses</th>
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<tr>
<td>Reduction in Inventory Carrying Costs (work in process, finished goods inventory)</td>
<td>80%</td>
</tr>
<tr>
<td>Improve Product Quality/Right First Time</td>
<td>70%</td>
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<tr>
<td>Reduce Indirect Labor Cost</td>
<td>60%</td>
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<tr>
<td>Cost of Regulatory Compliance</td>
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<tr>
<td>Improve Customer Service</td>
<td>40%</td>
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<tr>
<td>Reduction in Cycle Flow/Lead Time</td>
<td>30%</td>
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<tr>
<td>Introduction Cycle</td>
<td>20%</td>
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</table>

Food, Pharmaceuticals, and Medical Device Manufacturing only

NPV was not used to justify the business case for MES, but was reported by several respondents as an area in which substantial benefits had ultimately been realized.

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Bill Swanton, Alison Smith

The AMR Research Report, July 30, 2003

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Developing the business case for an MES project
Intelligent process instruments support MES and asset management

**Information Becomes Knowledge**

Intelligent process instruments help provide exactly the information that is critical for effective process control. Three examples demonstrate how tangible improvements in the workflow can be achieved with minimum investment.

Practically every production process offers potential for increased productivity when it is possible to measure the right data, place them in relationship to each other, and use them to automatically influence the process. Expensive hardware investments are often unnecessary; the use of intelligent field devices and their integration into the manufacturing execution system (MES) suffices.

**Quality analysis superfluous**

The chemical industry is a typical example: Different process media enter a preparation tank before being passed on to an agitator for mixing. For reliable process monitoring, not only the filling level in the preparation tank is measured according to the given recipe, but also the flow volume during transfer to the agitator. Then the two measured values are subjected to a plausibility test using an MES tool, and an automatic batch release is derived from this. This guarantees a reliable process, and expensive analysis of the end product can be eliminated.

**Optimum energy usage**

In very energy-intensive production processes in particular, energy consumption must be kept within exactly defined limits in the form of steam and electrical currents, both to guarantee optimum operation of the plant and to avoid unnecessary extra consumption. In the MES, the values measured by several process instruments are combined with an appropriate algorithm and an equivalent value is calculated which is used to directly affect the workflow. The result is not only a low energy requirement but also constant operation of the whole plant at its most cost-effective utilization levels.

**Maintenance as required**

Scheduled maintenance protects against unscheduled downtimes and therefore considerably increases the cost effectiveness of a plant. Here too, intelligent process instruments must be used to monitor all the critical operating states and make sure, for example – in connection with a special maintenance analysis in the MES – that wearing parts are replaced before their failure leads to downtime for the whole production process.

Find out more:

- www.siemens.com/processinstrumentation
- www.siemens.com/simatic-it
- e-mail: hans-juergen.huber@siemens.com

Always ready to listen

The forum for users of process instruments and analytics will answer your questions about these and other topics.

E-mail: forumchemical.pia@siemens.com
Dr. Horst J. Kayser on the benefits of Simatic IT

Highly Flexible, Standard-based and Scalable

With the economy slowly picking up speed, enterprises around the globe are more and more inclined to invest in new technologies to ensure and increase their competitive edge. But more so than ever, new technologies also have to prove their worth – and that is also true for MES solutions. Do investments in MES in general and Simatic IT really pay off? And what can Simatic IT actually do for a company’s production processes? We spoke with Dr. Horst J. Kayser, President of the Industrial Automation Systems Division at Siemens, to give some answers to these questions.

Dr. Kayser, MES such as Simatic IT claim to help users by bridging the gap between ERP and production. But why do you need an extra system for that – couldn’t ERP systems do the job?

Kayser: ERP systems consider a plant to be an ideal “black box”. In reality effective manufacturing requires coordinating and synchronizing the use of machines, people and applications throughout the entire product lifecycle – this is exactly what MES does. It is, so to speak, the missing link between the automation and ERP layer and actively supports ERP in better carrying out its job. As a result, MES dramatically optimizes plant productivity, product quality, and production flexibility. It also increases the productivity of customers’ ERP systems.

What does the user expect from an MES system?

Kayser: To protect their investments and obtain a maximum return on investment, customers expect two things: products of the highest quality, with state-of-the-art functionality, and unparalleled compatibility – and also comprehensive services and support. This also includes product consulting, documentation, training, and warranties. At the same time MES solutions need to fully match customer’s requirements without the risk and duration involved in a custom software project. With Simatic IT, Siemens is living up to these expectations.

What makes Simatic IT so different from other MES products?

Kayser: Many MES solution based on a combination of different software packages and customized software have grown overly...
complex in an attempt to cover all the requirements of a vertical market. We believe this “best-of-breed” approach cannot fulfill today’s demand for highly flexible, standard-based and scalable MES products. Simatic IT Framework explicitly represents the customer’s production processes as graphical workflows. Our Simatic IT Components then provide the MES functionality needed to address the specific manufacturing issues identified in the ISA-95 standard. You could say that the Simatic IT Production Suite combines the advantages of proven and tested products with those of a fully tailored solution.

"Ultimately, Simatic IT reduces the total cost of ownership of an MES solution."

ISA-95 has become the international standard for MES. To which extent does this standard influence the development of Simatic IT?

Kayser: Just as S88 for Batch execution, ISA-95 has become the de facto standard for MES. Today, an increasing number of customers are requesting ISA-95 compliance to secure their investments in MES. Software that is developed according to ISA-95 is particularly modular and can be customized to customer’s current and future requirements in a very efficient and fast way. The standardization of interfaces and terminology ensures optimal compatibility, and this reduces the solution’s total cost of ownership, increases the return on investment and also secures investments in existing systems. As a member of the ISA-95 Committee, Siemens actively contributes to the further development of the standard. Siemens also was the very first MES vendor to offer a product that implements the ISA-95 standard. Indeed, Simatic IT not only covers ISA-95 functions but also actually uses ISA-95 as a blueprint for its product architecture.

Apparently, standardization and integration seem to be key issues with MES.

Kayser: That’s right: By its nature, MES must work seamlessly with any system it encounters. Simatic IT offers unrivaled integration capabilities and is of course fully integrated into the Siemens Totally Integrated Automation family of products. Simatic IT’s native integration with TIA also guarantees quick project implementations and compatibility across different generations of products. We paid great attention to integrating our process automation system PCS 7 and Simatic IT.

But exactly how does Simatic IT increase productivity and competitiveness?

Kayser: Simatic IT customers model their entire production know-how, exactly define the behavior of their operations and gather real-time data from the ERP and Plant Floor. Therefore, manufacturers can drive their operations much more effectively, increase flexibility and augment productivity. By reacting more quickly and appropriately to any kind of production event, Simatic IT helps manufacturers to reduce downtimes, scrap and rework, optimize inventory levels and respond more rapidly to customer requests. Simatic IT also provides the wall-to-wall traceability required by regulatory bodies, and the resulting information can be used for optimized decision making at every organizational level. Ultimately, Simatic IT reduces the total cost of ownership of an MES solution.

What about system integrators – how can they benefit from Simatic IT?

Kayser: Siemens offers a clear competitive advantage to its integration partners. Simatic IT is explicitly designed for implementation by System Integrators. It delivers cross-industry MES functionality leaving room for system integrators to add significant value. The unique industrial expertise of our partners can be captured and protected in Simatic IT libraries. This allows our partners to productize their know-how and reuse it efficiently in their projects. Indeed, Simatic IT partners have been able to save up to 40 percent of project costs using this approach.

What are the priorities for improvement in the future?

Kayser: At first we have deliberately focused on the primary processes of our customers in the so-called hybrid industries such as chemical, food and beverage, as well as the batch and continuous process industries. Now we are adding substantial functionality in order to increase our penetration into the Discrete Manufacturing market. These new capabilities will allow our customers to extend their capabilities to their secondary processes.

Thank you very much for the interview.
Efficient integration from plant floor to ERP

Information Backbone

Danone SA, part of the Groupe Danone, has entrusted the implementation of its Manufacturing Execution System (MES) to Siemens Spain. The focus of the project is the management of the filling lines and the ERP integration of two of its plants in Spain. The Siemens MES solution Simatic IT automates and integrates production processes. Now Themis, the worldwide SAP version designed for Danone, can achieve overall integration through a single interface.
The Groupe Danone is widely recognized for the dynamism and strength of its brands. Through its three core businesses, Fresh Dairy Products, Beverages and Cereal Biscuits and Snacks, Groupe Danone generally leads the way in setting trends in consumer tastes. It was among the first to recognize the need for a wider variety of healthy, easy to consume any time, any place foods.

The Groupe is number one worldwide in fresh dairy products and packaged water and number two worldwide in biscuits and cereal snacks. Danone is also the number one dairy manufacturer in Spain, producing many of the best known brands. In the yogurt segment alone, such household names as Vitalinea, Yoghourt Griego, Bio, Yoghourt Natural and the probiotic drink Actimel immediately come to mind.

The solution that was initially implemented to cover plant information and key performance indicator (KPI) management of the filling lines was so successful that Danone Spain decided to turn to Siemens Servicios Industriales, the Simatic IT Certified Partner, once more for help. They needed a seamless integration of Themis, the Danone worldwide ERP system, with the different plant systems of the plants in Parets del Vallès and Aldaia.

Danone’s confidence was inspired by the proven expertise of Siemens Spain’s project team and its Simatic IT-based MES solution.

The business challenge
The backbone of Danone’s worldwide presence and leading position is its ability to adjust quickly and successfully to changes in business environments. Themis, the group-wide SAP version, was launched in 2001 to enhance this level of responsiveness. By improving the information flow and simplifying and harmonizing operating processes in all business functions, Themis enhances the effectiveness of operations worldwide.

For Danone Spain, Themis highlighted the need to optimize existing production processes and data flows and ensure high-level integration and communication between management and production. A standardized solution to these requirements was needed; one allowing for future growth and improvements and including the capability to rollout to the other plants of the group with minimal additional effort.

The IT challenge
The plants in Parets and Aldaia required an MES system for the filling lines that would end the paper-based maintenance and distribution of plant data that was causing waste, errors and delays and resulted in poor KPIs. A tighter integration between different processes and systems was needed to avoid the same information having to be manually introduced and processed within different plant systems.

What Danone wanted were tools and solutions that could manage production processes and synchronize the ERP-defined product and production requirements with the plant capabilities. They also wanted to gain real-time visibility of production processes to avoid high costs and to improve forward scheduling and resource utilization.

New production lines at the greenfield plant in Aldaia were planned that would have their own functionality. What was needed was a standard and parameter-based solution that could be easily rolled out to other plants quickly and without reengineering.

Benefits at a glance: Simatic IT at Danone

- Improved production efficiency, scheduling and planning
- Improved resource utilization and throughput
- Reduced waste, errors and delays
- Increased process visibility
- Improved real time reaction to plant events
- Improved traceability
- Improved operator interaction and facility of operator procedures
- Reduced downtime
- Improved KPI quality and analysis
Standard, guaranteeing future-proof technology. It combines a stable, standard product with the capability to adapt it to specific manufacturing processes at other Danone plants. This is due in part to the use of libraries that allow storing of functionality and plant models for later deployment. Simatic IT thus combines the advantages of a standard product with those of a tailored solution, perfectly capable of addressing all of Danone’s particular quality and production issues.

Simatic IT now serves as the platform coordinating and modeling the production processes of the different Danone plants. Its integration capabilities cover the entire plant, from the automation level up to the ERP level, delivering the functionality required for optimized production management and control.

Starting from the automation level of the plant, Simatic IT collects the relevant field data in real time and archive them for later analysis. Continuous monitoring of KPIs increases responsiveness to any event, resulting in improved overall process management. Continuous monitoring of KPIs increases responsiveness to any event, resulting in improved overall process management.

The production data flow from the entire production line to SAP is handled now by Simatic IT. The interaction basically consists of four interfaces. Once a day all product-related Master Data, such as product data, BOM, and production data, are downloaded from ERP to MES, which then distributes these data to the rest of the plant systems. Production orders are also downloaded from ERP to all the plant systems through Simatic IT once a day. The order status is uploaded in real time from MES to SAP. Every time the status of an order changes in the filling lines, ERP receives a message from MES with information about performance and order times. An inbound order confirmation takes place for every pallet that is produced, which consists of an online message from MES to SAP with relevant information about this pallet.

**Standardized approach**

The Simatic IT implementation at Danone is a clear demonstration that the new approach of MES resulted in savings and better integration of earlier IT investments. Simatic IT follows the ISA-95 international standard, guaranteeing future-proof technology. It combines a stable, standard product with the capability to adapt it to specific manufacturing processes at other Danone plants. This is due in part to the use of libraries that allow storing of functionality and plant models for later deployment. Simatic IT thus combines the advantages of a standard product with those of a tailored solution, perfectly capable of addressing all of Danone’s particular quality and production issues.

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The integration with the ERP level, which was realized through Simatic IT Server, allows continuous and transparent
Simatic IT covers the MES level at Danone Spain, acting as the single interface communicator between the enterprise-wide business system SAP, where higher-level decisions on production are taken, and the production process. But Simatic IT also offers the functionality to provide flawless collection, management and presentation of appropriate data, all according to Danone specifications.

Simatic IT offers top-down visibility within the Danone plants and production process, allowing the full configuration of tracking and tracing functions with its built-in capability for upstream or downstream product genealogy. This function allows tracking of which batches were used for a specific product and which end products result from a specific batch. In case of a product recall, the product genealogy helps to identify risks and reach timely decisions on appropriate actions to limit damage and liability.

**Multiple benefits**
The automation of the information flow results in an optimized availability of production information, from production management to plant systems and vice versa. The results and KPIs from production data collection are now available online. The automatic real-time data integration between the plant systems ensures top-down plant visibility. The automatic quality data acquisition and maintenance management puts Danone in a particularly strong position in terms of regulatory compliance requirements.

The Simatic IT solution proved to be so flexible that the redesigned and modified concepts and data flows from the existing plants can be implemented in new production lines as well. Now, required functionality is covered with only minimal additional reconfiguration.

**Going ahead**
The MES project with Simatic IT in the filling lines took place in 2002 and was completed in 2003. Since the go-live date, the project has been extended, due to the implementation of new production lines in the Danone plants and new functional requirements resulting from changes in information flows and management within Danone.

In 2003, the implementation of Themis (SAP) as the Danone corporate ERP system led to the launch of the SAP integration project, with the necessary implications for the production management systems. The first phase of the SAP integration was finalized and went live in January 2004.

Simatic IT has armed Danone Spain with the capabilities it needs to face future challenges, consumer requirements and changing regulatory standards. Productivity of modern filling machines isn’t measured by throughput alone. Today, other factors also play an equally important role, including flexible and efficient order handling, the optimization of downtime, and improved use of warehouse capacities. All of these, in fact, describe the functions of a filling management system linked to the state-of-the-art Simatic IT Manufacturing Execution System.

With the completion of the Simatic IT reports and the adaptation of the Filling Lines System to the new SAP criteria, the Danone Spain Parets and Aldaia plants are ready for any upcoming regulations and future growth.

**Find out more:**
www.siemens.com/simatic-it

_e-mail:_ marketing.simatic-it@siemens.com
Component-Based Automation at Philip Morris

Flexible on Principle

Setting up a production line or simply changing individual functional units normally means rewriting or completely changing parts of the automation software. With Component-Based Automation, plant operators can now eliminate much of the work – and at the same time considerably increase the flexibility of the plant, as the application at Philip Morris shows.

Philip Morris International is continuously developing and testing new processes at its Neuchâtel facility, that then go into operation on a larger scale at other locations. A typical example is a pilot plant in which the production automation has been implemented consistently for the first time with Component-Based Automation.

In this “Mini-Primary,” new tobacco blends and processing methods are developed, tested, and finally transferred to production plants all over the world. The new plant is identical in process technology to the approximately 10-times-larger production processing lines. It is made up of stations for storing, weighing, conditioning, cutting, blending, flavoring, casing, and drying different raw tobaccos. The individual stations are connected to each other by conveyor belts and vibration conveyors. Machines from different manufacturers are used.

The Mini-Primary is used both for making control blends and for testing adaptations and optimizations of existing lines – a very important aspect in the design of the Mini-Primary. Here, not only the parameters of the individual stations are being changed constantly for optimum results, but the stations themselves often have to be replaced by newer and improved solutions. The innovation cycles for dryers in particular are very short and the results in the application very different, so the stations in the Mini-Primary need to be changed often.

Flexibility by modularity

A system such as the Mini-Primary at Philip Morris demands a complex automation technology which is not only capable of adapting a large number of parameters to each other but which can be adapted to new technologies without great effort at any time. Philip Morris achieved this with a totally new plant concept based on consistent modularity.

The automation technology of the new plant was implemented by the experts from ISIS (Industrial Software and Information Systems), based in Treviso, Italy. ISIS is an experienced systems integrator that has earned itself a good reputation, particularly in the tobacco industry.

Machines as building blocks

The nucleus of the component-based solution from ISIS is a strict delineation of all open Industrial Ethernet standard for automation established by the Profibus user organization, Profinet meets all the requirements for automation with Industrial Ethernet and supports uniform communication from the enterprise management level to the field level.

Profinet relies on integrated real-time communication and the unrestricted utilization of open IT standards and TCP/IP. Profinet offers the real-time (RT) feature for transmitting time-critical signals. For high-performance synchronized motion control applications, Profinet offers isochronous real-time (IRT). The direct linking of distributed field devices to Industrial Ethernet is easily accomplished.

Component-Based Automation

In Component-Based Automation, the independent, intelligent modules can be tested and completed in advance. Then the plantwide interaction of the modules need only be configured locally. The configuration of the communication between the intelligent devices is performed with the Simatic IMap engineering tool. The software components are imported to the project library and configured graphically by drawing lines. There is no need for intervention in the individual devices and controls.

Component-Based Automation is based on Profinet and Profibus. Profinet enables manufacturing-wide communication, plantwide engineering, and smooth integration of Profibus by proxies. As an
application programs of the individual function units. These units include, for example, the Feeder, Tunnel Belt, Dryer, Flavor Cylinder, and Direct Conditioning & Casing Cylinder and have been defined as self-contained, separate units, each with its own distributed Simatic ET 200X device with an integrated CPU. The controls of the individual units are linked via Profibus and one Simatic Net IE/PB link each with proxy functionality to a master Industrial Ethernet ring in redundant configuration. Two master Simatic WinCC servers are used for the visualization of all plant parts; they supply several clients with the latest process data locally via Ethernet.

**Systems become transparent**

The result is essentially plug-and-play automation technology. Because every functional unit – that is, every component – operates as a self-contained system, no more expensive and work-intensive adaptation of individual devices and controls is necessary when the unit is changed. Instead, the self-contained machine program has only to be linked to the rest of the system and given the right parameters – a job that is soon done with the help of the Simatic iMap engineering tool with a graphical user interface.

But the time advantage in setting up the automation technology is only one of the benefits of Component-Based Automation. The clear separation of the individual function units allows sources of error to be easily identified. With this solution, individual sensors and conveyor drives can be addressed directly via Profinet, in addition to trouble-free machine-machine communication. Countless interfaces can therefore be dispensed with, the entire system diagnostics can be performed by uniform mechanisms, and the function of the whole plant becomes more transparent.

After the positive experience with the pilot plant, Philip Morris was so convinced of the merits of Component-Based Automation that the company has already started initial projects aiming to introduce the principle in ongoing production.

**Find out more:**

[www.siemens.com/cba](http://www.siemens.com/cba)
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The individual components and processing modules can be individually combined, giving Philip Morris maximum flexibility.
User Community conference explores the future of process automation

Tracks to Success

“The user conference demonstrated the broad range of Siemens capabilities in the process and hybrid industries. We share more than just our leading PAS systems and software with our customers,” said Paul Camuti, vice president chemical and pharmaceutical business, and general manager Siemens Process Automation Systems US. “We also share a commitment to delivering consistent and innovative solutions in close cooperation with our customers.”

Users of Siemens process automation, process safety, and manufacturing execution systems from throughout the world came together in Atlanta from March 17 through 19 to share their own experiences and best practices with process automation and to learn about latest product developments. This year’s conference provided attendees with more than 40 sessions covering product enhancements, system efficiencies, and new technology developments and also included, of course, hands-on training and product demonstrations.

An ideal format for process control engineers and managers, the conference allows participants to exchange information about challenges they are facing and how they are using Siemens products to meet them. “The conference has proven to be an invaluable asset to all participants,” said Gary Dickinson, new chairman of the user community, and superintendent, I&E at CF Industries. “Hands-on experiences from members, coupled with Siemens’ technical expertise, work well together to advance the process automation knowledge base.”

Networking knowledge and experience

“We took full advantage of the availability and accessibility of the Siemens product experts, product managers and senior managers to provide feedback and identify additional opportunities for improving our company’s bottom line,” said Chris DaCosta, controls platform manager at Air Products and Chemicals, Inc., who became user community vice chairman at the conference. “The conference also provided the ideal environment for networking, sharing and learning from the real life experiences of other Siemens users around the world.”

According to Joe Borkowski, marketing manager, Siemens Process Automation Systems US, the company also benefited. “We came away with a better understanding of our customers’ current and future needs, which is invaluable input for our own product and service development efforts,” said Borkowski.

The next Siemens Process Automation User Conference is scheduled for the spring of 2005.

Find out more:
www.sea.siemens.com/process
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Real-time analysis of process gases with Maxum and MicroSAM

Always Online

Determining critical process parameters and concentrations directly, without complicated sampling and delayed evaluation – these are the important advantages of online process gas chromatography. Lonza AG exploits these advantages and uses the Maxum and MicroSAM process gas chromatographs for optimum control of the cracking process in one of its production plants.

Lonza AG’s history goes back to 1897 when the company began manufacturing calcium carbide for the lighting market. Today the group manufactures various chemical products through the cracking of light petrol or liquid gas.

Online analysis with short cycle times

The Lonza group runs a naphtha cracker for the production of ethylene, acetylene, and hydrogen in Visp, Switzerland. The combustion gas used and the crude gas produced in the cracking process are now being analyzed directly during the ongoing process with the aid of two Maxum Edition II process gas chromatographs. Maxum is equipped with the flexible double-oven concept of one energy-saving airless oven and one programmable airbath oven. Different detectors can be used to run complex analyses in a process. The purposely simple valveless design of this device allows simultaneous analysis of up to eight components within one cycle of approximately two minutes. This has helped eliminate the previously necessary offline analysis – with the significant advantage that the operating parameters can now be adapted without delay according to the actual gas composition at the time. That helps keep the plant running under optimum operating conditions at all times.

Maximum precision in a confined space

Lonza uses the extremely compact MicroSAM gas chromatograph to monitor the liquid gas. The smallest explosion-proof online process gas chromatograph from Siemens can be integrated easily in almost every plant. The entire device is only about as big as a saucer. MicroSAM’s multiple parallel detectors give extraordinarily accurate analysis results because the thermal conductivity detector array measures not only at all column and vent flows but also picks up the dosing peak before the chromatography column. A new electronic pressure control also ensures maintenance-free column switching.

Find out more:
www.siemens.com/processanalytics
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A look inside the new analytics container: two Maxum Edition II process gas chromatographs and the extremely compact MicroSAM process gas chromatograph.
Production of oil additives at Degussa

Well-oiled Machinery

The Degussa RohMax Öl Additive division is a world leader in the demanding market for tailor-made additives based on polyalkylmethacrylates for applications in industrial, automotive, and aircraft lubricants. A well-oiled production plant has been running for the last two years in Weiterstadt, and, thanks to Simatic PCS 7, it is well prepared for future challenges.

RohMax Öl Additive employs about 400 people at numerous locations in Europe and North America. The production plants for additives at the Weiterstadt site in Germany went into operation in the early ’70s and were state of the art for automation at that time. However, spare parts procurement was becoming increasingly difficult and expensive, and the existing technology needed to be replaced by a modern process control system that could be optimally adapted to the requirements of production. After careful research, Degussa chose the Simatic PCS 7 process control system, which, thanks to its open interfaces and scaleable system platform, was best suited to meet the requirements for flexibility and economy.

The software challenge

The project began in the fall of 2000. To minimize interference with ongoing production, the new system was to be installed, set up, and a dry run that covered the entire functionality was conducted in parallel to the producing plant. Only then was the new process control system to be placed into operation.

The user software for controlling the pumps, valves, and shutoff devices in the pipeline system between the production and mixing tanks posed a particular challenge. Every vessel had to be capable of being shut off by gate valves. When pumping from one tank to another, the HMI system of the PCS7 needed to automatically display the target tank corresponding to the start tank and then select the appropriate pipe route. All other tanks connected to this pipe route have to be locked automatically and only released after the pump process was completed.

Rapid conversion

The user software was created in just four months, in close cooperation with experts from Siemens and the local Degussa service. After exhaustive testing with the Winmod simulation tool, production was converted during the scheduled shutdown over Easter 2001. Together with Degussa staff, the Siemens team reconnected the existing sensors and actuators to the prepared control modules and tested the system. The uniform central access and mon-
Monitoring possibilities of the Simatic environment ensured rapid progress, even though the work extended over two buildings and various outdoor plant components.

In just five days, 800 valves with feedback sensors, 158 drives, 64 control circuits, and 124 analog values were connected to the new Simatic PCS7 process control system and placed back into operation one by one.

On the Tuesday following Easter, the “ready” message reached the management at RohMax Öl Additive exactly as scheduled. Production was then able to continue without delay with the new process control technology – right on time and without a hitch.

New design possibilities

The successful commissioning was by no means the end of the effective partnership between RohMax and Siemens, however. The originally planned implementation has since led to new design and optimization possibilities in production. Due to the high degree of flexibility and the straightforward engineering of PCS7, ideas for process optimization can be implemented quickly and without great risk.

The plant can be adapted much more flexibly to changing conditions with the Simatic PCS7 process control system. Maintenance is also much easier. The simple archiving and rapid access to process data in the form of online trend diagrams of the process and control parameters are an indispensable tool for plant operators and engineers. Operating errors and unwanted product intermingling are virtually eliminated with the new technology.

As a result of this project, the RohMax Öl Additive division decided in August 2003 to continue its successful cooperation with Siemens and upgrade PCS7 to the current Version 6 with a client/server architecture and the Simatic Batch modular batch system. Siemens is currently implementing a manufacturing execution system (MES) with Simatic IT Framework and an SAP link. In the future, RohMax will be able to decide for every SAP order whether production is to run fully automatically via Simatic IT or conventionally with standard production cards. This option will be retained in the future as an emergency alternative in order to guarantee operation in case of possible failure of the IT infrastructure.

In the meantime, both Simatic PCS7 Version 6 and the Simatic IT solution have been implemented. Simatic IT is running in the trial phase in Weiterstadt. The next step, the final integration of Simatic IT and PCS7, is planned for August of this year. Both Siemens and Degussa are already certain that this project will also be a huge success.

Find out more:
www.siemens.com/pcs7
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e-mail: ruediger.alshuth@siemens.com
Upgrading the Oseberg Field Centre to Simatic PCS 7

Offshore Challenge

Norsk Hydro has issued a contract to Siemens for the upgrading of the control and safety systems at the Oseberg Field Centre. This contract is worth about NOK 250 million, and the project will be completed in mid-June 2006. The “Oseberg Field Centre DISCOS to SAS” contract is a major one, covering the complete process automation, safety systems and control room facilities for three platforms in the Norwegian sector of the North Sea.

Since last October, a joint team from Norsk Hydro and Siemens has been working together in Bergen and Oslo on the DISCOS to SAS project. They are replicating onshore the ‘old’ and ‘new’ systems. The end date for the SAS implementation offshore is mid-June 2006.

The Oseberg Field Centre is located about 130 km northwest of Bergen, includes three platforms, produces some 150,000 barrels of oil and exports up to 30 million standard cubic meters of gas per day. Including the adjacent fields dependent on the Oseberg Field Centre, the total export volume is 400,000 barrels of oil per day.

‘Hot’ replacement

At present, the plant is being operated via a 1980s Teleperm M computer system known as DISCOS (Distributed Supervisory Control and Safety System). Talking in the project’s Bergen headquarters – a 100-year-old former fishing net factory acquired specially for the project by Siemens – Hydro Project Manager Gunnar Flakstad says: “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 (HMI), which is an important aspect closely related to Health and Safety. The main challenge of this project is that we intend to do the changeover mainly while the offshore system is up and running and partly during a maintenance phase of four days.”

Neither Siemens nor Hydro has ever undertaken a project of this scale and complexity before. Bård Berle, Siemens Site Manager in Bergen, emphasizes the uniqueness of the project: “The gradual replacement of 100 process and safety automation systems with approximately 35,000 I/O on a ‘hot’ plant, not to mention the 50 new HMI computers, will definitely be a major challenge. This is considerably more complex than replacing controllers onshore. Therefore, we are building the new system in a room the same size and layout as the offshore control room to make sure it works perfectly before we transfer it to Oseberg.”

Exchange of expertise on-shore

Offshore operators are spending time in Bergen working on the new systems’ key health, safety and environment features such as HMI and reliability during the 18-month onshore phase. For Hydro Technical Manager Fritz Eilertsen the involvement of offshore workers is vital. He says: “We all want this project to succeed so we need the day-to-day knowledge of people from Oseberg Field Centre to work through the details of the new system.”

So far, progress with this challenging offshore project has been steady. Already, the benefits of Simatic PCS 7 are beginning to show. Operator Tom Eckholdt is one of the people testing the new system and he is delighted about the upgrade: “It is much more modern, offering better visualization tools and is more reliable. The new system will make our jobs easier.”

Find out more:
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Oseberg Field Centre and Oseberg D
Simatic Route Control

Flexible On Any Route

A flexible route control system is especially crucial in production plants with interconnecting transport routes. Simatic Route Control integrates smoothly with Siemens process control technology and can be adapted to any situation at any time without programming effort.

Simatic Route Control is an extension of the Simatic PCS 7 process control system. The system is industry-neutral by design and can be used in conjunction with various goods and products. The smooth integration with the process control system provides an optimally adapted comprehensive solution with which not only production processes and related warehouses can be controlled automatically, but also the entire material transport.

A notable feature of Simatic Route Control is the practical and intuitive user interface. It offers extensive support for the user in every operating phase and allows easy adaptation, optimization, and modification of transport routes.

Configuration instead of programming

Operators of complex production plants with numerous and interconnecting transport routes can benefit from the flexibility of Simatic Route Control, especially when it is necessary to frequently convert or expand the route network. Route Control is not an independent system that has to be reprogrammed with every change; rather, it is integrated directly into the configuration of the Simatic PCS 7 process control system. All elements of the route control system are modified using the CFC-Editor, and uniform interface components from a special library are used, providing all control, parameter, and connecting elements.

An engineering tool is available for the configuration itself. The configuration data are kept on a special server, which then calculates the optimum transport route dynamically, based on the parameter values valid at the time the material transport is requested. This online approach allows changes to be made at any time, and these changes are then taken into account for the next transport route request.

Flexible through and through

Simatic Route Control uses the basic hardware of Simatic PCS 7 and can be implemented as a single-station system in small plants. As a rule, however, a client/server configuration is used, with up to 32 clients assigned to the server. The Route Control Center can be set up both on the OS client and on the batch client or a separate Route Control client. The entire system is therefore extremely flexible and almost infinitely scalable. Availability can be increased even further by using a redundant design.

Find out more:
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CASE STUDY

Weighing Technology

Siwarex A at Mercator in Ljubljana, Slovenia

Perfect Dosage

The filling and packaging of food products is becoming subject to increasingly competitive conditions under stricter and stricter hygiene regulations. The mechanical and electrical components of a filling plant must therefore be optimally adapted to each other and to the appropriate software. One example of an integrated solution is in operation at Mercator in Ljubljana: Siwarex and Simatic systems guarantee highly accurate dosing of cocoa powder.

The filling volume of cocoa packets may only deviate from the nominal by 5 grams – even if the specific weight of the cocoa powder is subject to natural fluctuation. The weighing processor, together with the plant automation system, must perform this dosing task reliably 2,200 times every hour. The company A.C. S.p., which has specialized for many years in the automation of filling plants, made use of an order to upgrade an existing machine and implemented such a dosing solution for the first time with the Siwarex A weighing module.

Totally Integrated Automation: Simatic and Siwarex

The cocoa powder is fed from two tanks over feed trays into four containers. These containers empty into seven hoppers, which, in turn, fill the plastic cans. Four Siwarex A with one OP7 operator panel and one Simatic S7-300 control the four-head dosing plant. The operator selects a nominal value on the OP7 and can check the current weight, the nominal-actual deviation, and the status of the machine at any time. The operator can also parameterize and calibrate the scales with the OP7. In this application, the stainless steel version of the high-precision Siwarex R system is used.

A.C. S.p.’s experience with the first Siwarex A solution has been entirely positive. The project was implemented in a very short time because the automation and the dosing systems work together smoothly, thanks to Siwarex and Simatic. Moreover, the prefabricated software modules saved a great deal of time in configuring and parameterizing the systems. Mercator is also very pleased with Siwarex. The throughput has been increased to the set target, and the required accuracy has been attained.

Find out more:
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Ultrasonic sensors for conditions of explosive dust

Conductive According to ATEX

A new version of the Echomax ultrasound sensors comes with a special patented black casing material that makes them conductive in accordance with the requirements of the ATEX guideline. They comply with the safety class Ex II 1D and can be used in conditions of explosive dust, typical for applications involving grain, coal, flour, and sawdust.

The ATEX directive 94/9/EC – also known as ATEX 100a – was passed by the European Union to support the free traffic of goods and came into force on July 1, 2003. It unifies the legal provisions of the member states regarding products destined for use in areas where there is a risk of explosion. This directive covers protective systems and electrical or mechanical equipment. One category of the ATEX directive deals with conditions of explosive dust.

The elimination of ignition sources such as static electricity is an important measure for the prevention of dust explosions. Therefore, special requirements apply for the use of equipment – including process instruments and sensors, in particular – to prevent electrostatic discharges. One method is to make the material of the contact device conductive enough to dissipate the static charge.

New casing material prevents static charging

Echomax XPS ultrasonic sensors are frequently used in dust-intensive applications in mining, quarrying, and cement and food industries and already have the Ex II 2 G/D license. To obtain the license for constant use in conditions of explosive dust as specified in the ATEX guideline, a version has now been developed which is covered in a special conductive casing material. The new Kynar compound material provides the necessary conductivity to eliminate damaging static charges and at the same time retains all the advantages of the original Kynar.

Oxymat 6 licensed as a gas monitor

Monitoring systems for oxygen play an important role in active explosion protection because oxygen – right in inflammable gases and next to ignition sources – is the third most common cause of explosions. The Oxymat 6 gas analyzer, in both the 19-inch and field unit versions, was successfully tested by Deutsche Montan Technologie GmbH (DMT) in 2003 according to ATEX 95 specifications. It can therefore be used in the appropriate configuration for all monitoring tasks relating to explosion protection in industry, in zones 1 and 2, in conditions of explosive gases.

One of the first companies to use the newly certified Oxymat 6 is DEUREX Micro Technologies GmbH in Tröglitz.

Find out more:
www.siemens.de/processanalytics

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You can find more detailed information about these case studies at: www.siemens.com/processnews

ATR GmbH & Co. KG recently implemented a 21 CFR Part 11–compliant visualization solution for a new filling line for a customer in Vienna. From all the various possibilities, ATR and the end user ultimately chose a solution based on Totally Integrated Automation using the Simatic WinCC visualization system and special add-ons for validation-relevant aspects. The excellent price/performance ratio was ultimately decisive, in addition to the ease of use and scalability.

Fritz Hunziker + Co AG is a leading manufacturer of sweets. In addition to various kinds of sweets and iced tea, the company’s range of products also includes gummi bears. A Pointek level switch ensures that the casting plant never runs out of cornstarch and the bears always stay in good shape as a result.

Siemens has equipped a laboratory at ETH Zurich with the Simatic PCS 7 process control system. Aim: to offer trainee engineers a short, informative introduction to visualization and implementation in two afternoon sessions. Professor Dr. Adolf Hermann Glattfelder of the Institute for Automatics heads this project, which was launched about two years ago.
Knowledge base:

Literature about process automation and related fields

Technical books “made by Siemens” have been among the most acknowledged publications on automation technology worldwide – and are revised and edited continuously so they will live up to their excellent reputation. Apart from true classics like “Automating with Simatic”, the books also cover the latest trends such as the application of augmented reality technologies for development, production, training, and maintenance. You can find out more on the Internet:

www.siemens.com/automation/newscenter

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