Paradigm shift in industry

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“Due to ever-increasing productivity and efficiency requirements, industrial software is playing a progressively more important role in manufacturing.”
Industry software optimizing production

Today, industry is faced with enormous challenges: constantly shorter innovation cycles, greater flexibility, a shortage of resources, and fiercer competition. To stay on the cutting edge, companies must therefore increase their productivity while at the same time ensuring resource-friendly manufacturing processes. The key to success in this environment is flexible large-batch production using innovative hardware and software. This is why we support our customers throughout the entire production process – from product design to production planning, to production engineering and production itself, to services. Siemens offers reliable hardware solutions for PLCs, drives, identification systems, switching devices, and much more that are continuously being adapted to the requirements of the market, enabling further increases in production efficiency.

Due to ever-increasing productivity and efficiency requirements, industrial software is playing a progressively more important role in manufacturing. Supported by sensors and communications systems, software solutions today ensure the comprehensive automation of production facilities. Siemens is very well positioned in this regard with the Simatic IT manufacturing execution system, product lifecycle management (PLM) software, and the TIA Portal engineering framework, to name just a few of the company’s offerings. Tomorrow, innovative software systems and powerful hardware will integrate the entire process of development and production. This will form the foundation for the day after tomorrow – Industry 4.0. To this end, global energy and resource consumption in production, for example, are being optimally utilized. You can read more about this from page 6 on, in the interview with the CEO of the Siemens Industry sector, professor Siegfried Russwurm.

In this new issue of advance you will again find many examples of how production development and production processes can be optimized by using innovative software systems and powerful hardware.

I hope you enjoy the read.

Eckard Eberle
Head of Industrial Automation Systems
Extremely powerful industrial software is increasingly becoming a critical factor for competitive success for companies in all branches of industry – from brainstorming, design, and development, to simulation and validation, to production planning and production itself. We spoke to Dr. Siegfried Russwurm, CEO of Siemens Industry, about the opportunities offered by IT and software for industry.
“In order to stay competitive, we need new types of software systems that optimize the entire lifecycle of a product.”

Prof. Dr. Siegfried Russwurm, CEO, Siemens Industry
**Product design**

The PLM software makes it possible to virtually analyze alternative designs and thus develop, test, and optimize products on a computer without having to build a prototype.

The Mars Rover was digitally designed and virtually assembled, and its use on the red planet was simulated with the PLM software NX. The software also makes it possible to test individual parts and their interfaces with each other in advance.

**Production planning**

Thanks to industry software solutions such as press line simulation (PLS) or the virtual machine (VM), factories or individual machines can be developed on-screen, thus enabling the simulation and optimization of production.

During the retrofit of a 17-year-old Volkswagen press line with PLS software, the same motion control software was used in the simulation that is also in use in real production. This resulted in only minimal deviations between simulation and the real plant. During the subsequent upgrading of the press line, the number of strokes was increased to 16 from the previous 14.

**Production engineering**

The more hardware and software are being used, the more important it becomes for the individual systems to interact perfectly. With TIA Portal, companies can design all planning and production steps from a single monitor – across the entire value chain.

For the cost-effective and custom-fit manufacture of artificial knee joints, patient data are used in a continuous, highly automated process flow – first in a bone model, then in a prosthesis model, and finally in control data for the CNC machine in order to produce the implant. Based on a 3-D image of the patient’s knee, the PLM software NX CAM produces the CNC data for production. The subsequent manufacture of the implant is performed by the Sinumerik 840D sl control system.
networks. At the same time, they facilitate continuous engineering across the entire lifecycle of a product. The optimization potential of this interlinking of the value creation stages can be seen, for example, in the Siemens Electronic works in Amberg, Germany, where PLCs are manufactured. By using intelligent industry software such as Simatic IT and using Data Matrix Codes and RFID systems, the control knows where every product to be produced is currently located and whether it has passed quality inspection. The result is process quality of almost 100 percent.

It will still take some time before the goals of Industry 4.0 have really been realized, but we are working very actively on implementing them. One central component in this process is the digital enterprise platform, which will make formatting inconsistencies between the different phases of production a thing of the past and ensure that all data flows between the individual value creation stages are open.

Won’t Industry 4.0 lead to factories that are devoid of humans?
*Russwurm:* No, quite the contrary – the human factor will become even more important than ever. However, the employee’s area of responsibility will become more complex: he or she will no longer be an operator, but will rather control the parameters, since the product does not decide how it will be produced; in Industry 4.0, it selects at most a suitable production option.

The most advanced industry software solutions turn into money drains if there are no employees behind them developing the best products; setting the right production premises; and making independent, fast, and correct decisions with an alert and holistic view of production.

Professor Russwurm, thank you very much for talking to us.
Siemens AG, Germany

Data consistency – the key to productivity

How can we future-proof the mass production of industrial electronics in Europe? Integrated software solutions play a central role during the manufacture of Simatic. Examples from the production facility in Amberg, Germany, show the benefits of these solutions and the further potential they offer for increasing productivity.

Siemens Electronic works Amberg (EWA) has repeatedly won prizes as factory of the year. The manufacturing process for industrial electronics developed here serves as the model for additional Siemens factories – for example, a facility recently built in China. In factories producing controllers and HMI systems for the world market leader, people know all about automation. However, those expecting production facilities devoid of humans are in for a surprise: people continue to play an important role in Simatic production.
Gradual data entry

Stefan Ritschel, project manager in production planning, describes the intelligent utilization of software tools as an important key to success. The goal: relevant information from the product creation process is filed in a structured way from the start and in subsequent processes gradually supplemented with additional information. Production parts lists and work plans are transmitted from this database to the enterprise resource planning (ERP) system in order to supply the logistical and commercial processes. The technical information is passed on to the manufacturing execution system (MES) software – in some cases automatically – and is used to create the production schedule, among other things. This reduces manual entry and maintenance effort in production planning. The greater the integration of the software tools used, the more synergies are created throughout the product creation process. This goal is being pursued consistently in Amberg, and important intermediate targets have already been reached.

Product lifecycle management with Teamcenter

Teamcenter by Siemens is a powerful solution for product lifecycle management (PLM). The flexible and configurable software addresses the product’s lifecycle from portfolio planning to product development to production. Ritschel explains: “For us, Teamcenter is the central ‘data backbone.’ During production engineering we import the data relevant to the product and to production that were entered into Teamcenter during the development process. We also continue to update this database ourselves by adding information on our equipment and our production processes.”

Production optimization with Simatic IT

Simatic IT MES software was selected as the ideal supplement to Teamcenter for production implementation. This integrated standardized system with modules for all areas of production and process automation replaced a collection of isolated technical solutions introduced in the 1990s. The switch to Simatic IT was a great challenge for project manager Bernhard Hausmann and his team, since the existing systems had to be upgraded during operation without a noticeable decrease in production output. The requirements were met, and after a short period of use the potential benefits in terms of maintenance and service are already visible. “An integrated Windows-based system with consistent interfaces to Teamcenter, between the individual software modules, and to the production control level offers significantly more options than we had previously,” explains Hausmann. “We in IT benefit during operation, especially from the common architecture of the system, the uniform concepts for user management, the browser-based interfaces, and the uniform database structures.” The implementation of changes and new functions is much easier, and inconsistencies are eliminated.

Intelligent production control

Production in Amberg is based not on customer orders, but predominantly on inventory. The warehouse reports its need for certain Simatic products by inventory. The priority results, for example, from whether it is a case of regular

“Simatic IT supports us in meeting the requirements for quality and productivity.”
Stockpiling or compensation for a backlog. The order management system in Simatic IT structures the production orders with a higher degree of technical detail. This forms the basis for precise production control and for tracking the serial numbers pertaining to the order.

In the case of equipping circuit boards, it is possible to process orders for different products in parallel and even to allow the order to be broken up into separate lines through intelligent loaning of capacities. The subsequent enclosure assembly is therefore in some lines set to a batch size of 1 – which is quite unusual in mass production and is possible only with intelligent software support.

Circuit boards and finished products are tracked and traced in the subsequent assembly via data matrix codes. The assembled elements can be tracked by package. Process data such as temperature variation and atmosphere in the soldering furnace are documented at the respective workstations, correlated with quality data for the finished product, and optimized.

**Customized quality assurance**

Another important task of the MES software for quality assurance is what is known as interlocking. This process checks whether one or several previous processing steps, depending on the parameter assignment, were completely carried out and inspections marked as “PASS”. Screen displays are created for the visual inspection of circuit boards and enclosures, supported by the software and using the CAD data from Teamcenter.

The software supports not only the detection of errors during operation, but also their correction. Hausmann explains: “The higher the level of automation in production, the more important it is to record data in order to be able to detect and correct problems in time. However, the challenge is to get as much information as possible from as little data as possible, since every data transfer takes away system resources and impacts the performance. Simatic IT supports us in meeting the requirements for quality and productivity. We were able to reduce our error rate to currently 14 dpm [defects per million].”

“We decided against the polling of data, that is, the regular requesting of control data through the higher server. Instead, the control system reports any events independently to the MES level – this reduces the strain on the network and decreases the response times.”

In the longer term, the use of RFID tags could further lower the communication load in production. Other industries are reporting positive experiences with this; however, the process is currently still too expensive for the specific requirements of the production of circuit boards.

**Higher process quality, increased motivation**

The introduction of the new tools helped improve the quality of all the production processes. The benefits increase with integrated knowledge. For employees, this means a reduction in routine tasks and an increased emphasis on knowledge and creativity. The high motivation of the employees at the factory in Amberg is evidence that they enjoy this brain work.
A system provider for aluminum profiles is using a Simatic S7-1500 controller for automation of a new system for the first time. The innovative features of this controller have impressed the company, and the S7-1500 is now increasingly recommended for use in customers’ systems.

The possible applications for aluminum profiles are virtually unlimited, as confirmed by the product line of MiniTec, a global leader based in Schönenberg-Kübelberg near Kaiserslautern, Germany. MiniTec provides not only all kinds of common profiles, profile connectors, and accessories but also ready-to-use turnkey solutions. These may be simple transport trolleys, which are purchased in large quantities by mail-order companies; ergonomic workplace systems with vertically adjustable workstations; or conveyor systems of all kinds, which are very popular in the automotive industry, among other sectors. MiniTec also provides industry-specific systems – for the solar industry, for instance.

MiniTec wants to convince its customers of the advantages of the Simatic S7-1500, which is why the company has equipped its control cabinets with an extra inspection window.
Small part, big impact

A patented profile connector that enables very fast and precise fastening of profiles has significantly contributed to the company’s success. The chief benefit of this system is that absolutely no holes need to be drilled – a conventional hexagon key is enough. This power-lock fastener consists of a pressure piece with a threaded pin, which is screwed onto the front side of one profile. It is then mounted onto the side of the second profile and fastened in the desired position by means of a hexagon key.

The challenge in the automatic screw-in process is to make sure that the threaded pin is aligned correctly so that the hexagon key can be introduced smoothly for later assembly. This is why a new machine has been developed recently to screw in the threaded pin and to pack the connectors and the respective screws. The function of this machine is to separate the pins in a vibrating container, take them from the chute one after the other, measure them with a sensor, and convey them to the power screwdriver in the right direction. Another vibrating container is used to separate the respective screws and to synchronously eject them into what is referred to as a KanTainer. This process ensures that the customer receives the correct number of connectors and screws.

Standard in own systems

For the automation of this system, MiniTec has been using the new Simatic S7-1500 for the first time. “In fact, the system does not tap the controller’s full potential,” explained Florian Broy, the programmer responsible at MiniTec, “but we got to know the S7-1500 as pilot users and are already more than happy with it. Automating one of our own systems also gives us the chance to convince our customers of the benefits that go with it. It is our standard to offer state-of-the-art technology at all times and to use it ourselves.” The control cabinet for the new control system has been equipped with an additional inspection window. Cabling was implemented with Simatic Top Connect products, which guarantee error-free and safe connections between the individual components. “The new design alone impresses our customers and piques their curiosity. The advantage of the integrated display is obvious, and the increased ease of cabling, for example, due to the variable position of the front flaps, can also be easily demonstrated,” said Broy.

Competitive advantage thanks to new possibilities

The enthusiastic programmer is particularly happy about the huge random access memory of the Simatic S7-1500, which opens new technological opportunities in combination with the optimized performance. “Just one example: Customers increasingly wish to be able to print individual labels onto the workpieces from the control. That requires string processing, and the controls we have been using so far are reaching their limits due to their memory size.” Therefore, Broy has not been able to realize some of his own ideas and is now looking forward to automating the first customer system with Simatic S7-1500. He also sees concrete applications for the new trace function of the S7-1500: “Customers’ systems are often integrated into production lines. If we record the signal sequence on the interfaces, we might be able in case of an error to prove that our machine is still working, should the situation arise.”

Increasing requirements for visualization

By using a Basic Panel KTP600, profile thickness, lot size, and other parameters can be specified. In addition, individual steps can be carried out in manual mode. To make the process clearer, Broy has, among other things, pieced the movement of a power screwdriver together from several illustrations from the manufacturer so that the viewer gets the impres...
particularly helpful for programming is the possibility to “close” networks, so that for better clarity only the comments remain visible. TIA Portal provides perfect interaction between software and the Simatic hardware MiniTec uses. As far as interaction is concerned, there is another aspect that Broy is reminded of – the interaction with the Siemens sales department: “The support was great from the very beginning!”

Interaction makes the difference

For engineering and commissioning, MiniTec used TIA Portal, which the team members already knew and appreciated from the pilot phase. Thomas Wolf, who is responsible for control technology, agreed with his fellow programmer regarding the advantages of the engineering framework: “TIA Portal has so many little features that you intuitively learn, and in no time at all you come to rely on them, as they make work a lot easier.” A feature Broy reckons to be particularly helpful for programming is the possibility to “close” networks, so that for better clarity only the comments remain visible. TIA Portal provides perfect interaction between software and the Simatic hardware MiniTec uses. As far as interaction is concerned, there is another aspect that Broy is reminded of – the interaction with the Siemens sales department: “The support was great from the very beginning!”

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Sheet metal is used in mechanical engineering, for car bodies, and in electrical engineering. In these fields, uniform material strength and smooth surfaces are generally critical. To achieve these characteristics and optimize material properties, the rolled sheet metal is stretched and leveled in what are referred to as stretch-bend-leveling lines.

Burghardt + Schmidt GmbH, based in Remchingen, Germany, is a worldwide leader in the manufacture of stretch-bend-leveling lines. Its automation partner is DAA Delta Technik GmbH, a long-time Siemens Automation Solution Partner.

Fitter through retrofit

DAA Delta Technik has accomplished a systematic retrofit at a stretch-bend-leveling line from the 1980s. The implementation of Simatic automation technology and Sinamics converters increases the productivity of the plant and improves its usability.

The challenge of retrofitting key plants

“In addition to new systems, the number of retrofitting jobs is increasing as well,” says Jan van den Broek, managing director of DAA Delta Technik. Machines built in the 1980s are quite solid from a mechanical point of view, but replacement parts are no longer available, plant documentation is often incomplete, and source codes are unavailable as well. “Since those machines are key machines, there is an acute need for action to maintain and optimize production,” explains van den Broek. In cooperation with Burghardt + Schmidt, DAA Delta Technik has successfully realized many retrofitting projects all over the world – and recently in the United States. A prominent sheet copper manufacturer wanted to have its plant completely retrofitted over Christmas. The client urgently needed more flexibility for the implementation of customer demands and wished for improved plant usability. “We accepted the challenge – also because we knew that Siemens would be able to help us out on-site if needed,” says Peter Voß, sales engineer at DAA Delta Technik.

Centralized intelligence

The plant in the United States is powered by direct current drives. Existing converters were replaced by the new Sinamics DCM converters. Two Simatic S5-135 U units and the Simadyn D drive control system were previously used for control purposes. Special proportional valve control cards from the hydraulic supplier, integrated into Simatic S5, actuated the roller leveling supports.

The new concept is based on Simatic S7-400 with an integrated FM 458-1 DP. This freely programmable application component carries out the complex control of the eleven main drives linked to the system via Profibus DP. The proportional valves were connected to the control system via the Simatic ET 200S distributed I/O system. Thus, control and automation are combined in one central S7-400 rack. “We prefer concentrating intelligence in a single place to
be able to identify possible errors quickly and to transfer the memory card with the program onto a new module. An important advantage of the FM 458-1 DP is the possibility of intellectual property protection. The modules are interconnected via CFC and can be locked, which protects our know-how and offers the operator security that no undesired changes will be made to the program,” explains Voß.

Optimum usability and design

The plant is now visualized with Simatic WinCC, and the new operator panels are Simatic push-button panels. The openness of this solution increases flexibility and improves the usability of the plant. Helmut Mau, the project engineer at DAA Delta Technik who planned and also managed the retrofit, recalls the customer’s acceptance with pleasure: “The customer could no longer remember the exact capabilities of the machine. To be on the safe side, they had not run the machine at maximum speed for a long time. Now, the machine reaches 200 m/min again – at a higher quality.” The machine can now be quickly, easily, and precisely set for each job. The leveling results have been considerably improved. As a result, customer requirements were more than met – without any delays.

For van den Broek, what is unique about this solution is the integrated engineering: “Not only control and visualization go perfectly together, the Sinamics converters are also integrated so closely that we are parameterizing and diagnosing with Step 7 – also by means of remote diagnosis from anywhere in Germany, if necessary.”

Drive solutions with energy savings potential

DAA Delta Technik is also equipping new plants from Burghardt + Schmidt with the same automation and drive components, but with three-phase alternating current systems. “We are making use of energy recovery and the application of brake energy in the intermediate circuit of the drive line-up,” explains Voß. “The recovered energy can be used directly in the plant. As half of the drives are running in generator mode, the required power input is virtually halved. With Sinamics S120 and DCM we are flexible, as we can both modify new plants with alternating current systems and plants with the proven direct current technology and make them reliable in operation for many years to come.”

“Simatic and Sinamics can be parameterized and diagnosed with the same tool. This makes start-up and service much easier.”

Jan van den Broek, Managing Director, DAA Delta Technik

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Integrating an uninterruptible power supply (DC UPS) into networked automation applications is now much easier. The new Sitop UPS1600 communicates using Industrial Ethernet or Profinet and offers intelligent battery management as well as comprehensive diagnostic information. It is the first DC UPS to be fully incorporated into Totally Integrated Automation (TIA).

Intelligent battery management

The new Sitop UPS1600 DC UPS modules supplement 24 V DC Sitop power supply units for uninterrupted rated currents of up to 20 A from the Sitop UPS1100 battery modules that are based on maintenance-free lead-gel accumulators. Via Energy Storage Link, the Sitop UPS1600 automatically recognizes the battery type of the connected Sitop UPS1100 and charges it with the optimal temperature-controlled charging characteristics. The intelligent battery management system monitors all relevant data, including from battery modules con-
nected in parallel. For example, the aging of batteries is detected at an early stage so they can be replaced in time. The slim Sitop UPS1600 DC UPS modules in versions with 10 A and 20 A have dynamic overload behavior in order to be able to supply even high starting currents for 24 V DC loads such as industrial PCs. The high charging current quickly restores the buffer standby after a power failure.

**Profinet interfaces for communication**

Using the two Industrial Ethernet/Profinet interfaces with integrated switch functions, the Sitop UPS1600 is especially easy to integrate into networked automation applications. Battery status, diagnostic information, and values such as voltage, current, and remaining capacity are transmitted to the PLCs or PCs via TCP/IP or Profinet IO. Even remote diagnostics are possible through the integrated web server.

**Easy and fast engineering in TIA Portal**

Engineering is simple and fast in TIA Portal. Via the engineering framework’s hardware catalog, Sitop UPS1600 modules can easily be transferred into the network view using drag and drop and there linked with the Profinet user with which the data are to be exchanged. The desired battery modules are also selected using drag and drop in the device view. The further parameter assignment of the Sitop UPS1600 then follows – for example, of the connection threshold for the buffer voltage or of messages for diagnostic information.

During operation, a Simatic S7 function block in the Simatic S7 control unit evaluates the status and diagnostic data of the Sitop UPS1600. The function block can be downloaded free of charge for the Simatic S7-300, S7-400, S7-1200, and S7-1500 and is easy to integrate into the Step 7 user program. In case of a power failure, the 24 V buffering and the integration of the DC UPS via Profinet enable multiple Simatic S7 PLCs to be brought into a defined status even independently of each other.

**Visualization in Simatic WinCC**

Ready-made Sitop UPS1600 faceplates – these can also be downloaded free of charge – enable fast monitoring and control in WinCC. All the relevant operational and diagnostic data of the DC UPS and of the battery are easy to understand at a glance. Information such as buffer operation or alarm signals – for example, the absence of buffer standby – is visualized in the faceplate and does not need to be extensively programmed. This complete integration into TIA therefore saves time and reduces costs significantly during configuration and operation.

**Ideal for networked applications**

Due to its open communication via Industrial Ethernet, the Sitop UPS1600 can be integrated into networked applications to safeguard multiple industry PCs, for example. In case of power failures, the PCs connected to the DC UPS in a master-slave set-up can be shut off in a controlled manner and in a specified order, and the application can be brought to a defined idle state. This helps to prevent damages in the application. The intuitive and free of charge Sitop UPS Manager software for configuration and visualization supports the user to integrate the DC UPS quick and easy.

### Advantages

- Easy engineering in TIA Portal
- Fast product selection and network integration
- Comprehensive device parameter assignment
- Comprehensive diagnostic options for the DC UPS status
- Easy integration into Step 7 application programs with function blocks for Simatic S7-300/400/1200/1500
- Fast integration into monitoring and control systems with UPS faceplates for Simatic panels and Simatic WinCC
Ball bearing manufacturer SKF implemented an initiative to increase the environmental sustainability of its operations by reducing energy consumption in its facilities. To achieve this goal, the company is using B.Data, the scalable energy management system that captures energy and process values and analyzes them systematically. The system demonstrates where there is need for action and what effect efficiency measures are actually having.

The development of SKF GmbH, based in Schweinfurt, Germany, has been characterized by a great commitment to the environment since the company was founded in 1907. In 2012, the World Wide Fund for Nature (WWF) admitted SKF to the WWF Climate Savers list due to the company’s mindful use of energy. “In Schweinfurt, we even have a solar energy plant on the roof of our logistics center, with a peak performance of about 700 kW, which we are using to supply almost all the logistics operations with environmentally friendly power,” said Matthias Ennulat, head of electrical power supply, energy management, and service at SKF, citing an example of the company’s sustainability efforts. One of Ennulat’s responsibilities is energy management for about 50 production sites all over the world. Every facility with power consumption exceeding 0.2 GWh has its own energy coordinator who works closely with him to coordinate energy-saving measures and increase energy efficiency.

Striving to significantly reduce carbon dioxide emissions

The company’s latest project, “Beyond Zero,” which began in 2011 and will run through 2016, aims to reduce carbon dioxide (CO₂) emissions by 30% – a very aggressive goal, which is to be achieved through a wide range of measures. Thus, the company is now analyzing its entire value chain – raw material suppliers, logistics, production in plants, and utilization at the customer’s site – for sustainability. The company intends to use the positive results of its industrial management practices to reduce negative environmental effects and improve them. Products and services that meet these requirements constitute the Beyond Zero portfolio.

One of the project’s aims is to achieve total energy consumption for production that is 5% lower in 2016 than it was in 2006. A second goal is to lower the ratio of total energy consumption and added value by 5% annually beginning in 2012. SKF’s worldwide energy demand is about 1,868 GWh. At the plant in Schweinfurt, consumption is distributed as follows: machines 19%; heat treatment 18%; heating, ventilation, and air-conditioning 31%; and compressed air 10%. There are many other systems consuming power as well. This status provides the basis for future energy optimization.

Easy data processing thanks to scalable software

“For systematic data processing and later management, we were looking for suitable energy management software, and we found a good solution in Simatic B.Data. A decisive factor in the choice of Simatic B.Data was the simple transfer of data. We are now able to analyze data automatically and to optionally even implement controls at a later stage.”

B.Data," explained Ennulat. The scalable system for up to 30,000 data points can be used as a single-station system or a client/server system and can be optionally expanded by B.Data Web with a standard browser. “This is exactly the functionality we were looking for, so that easy, password-secured and role-based access is possible throughout the company anytime,” said Ennulat. Simatic B.Data enables both energy management, thanks to the precise visualization of all relevant values, and energy monitoring, thanks to the possibility of observing current energy consumption and deviations – both decisive factors in the mindful use of energy. As a first step in Schweinfurt, three significant parameters in the energy management software – energy consumption per year, savings potential, and an evaluation identifying the expected improvements – were visualized for 62 pump systems, 31 lighting systems, 30 production lines, 60 electric heaters, 7 hydraulic systems, and 238 ventilation systems. The simple data transfer B.Data offers is another advantage in SKF’s eyes. “Thousands of pieces of energy data have been captured over the years by the company’s own Simatic S7-400 controls,” said Ennulat. “Previously much of this information was manually collected, in sometimes confusing charts, but now we are able to analyze data automatically and to optionally even implement controls at a later stage.” The results realized are then verified in the system.

ISO 50001-compliant processes beginning in 2014

The collection of energy data enables consumer-based distribution of energy consumption, while the software helps precisely identify and prioritize savings potential. This is very important, as the facility is planning to introduce ISO 50001, an international standard for energy management systems. The central aspect of this standard is the constant improvement of an organization’s energy-related performance with the aim of increasing energy efficiency and optimizing the use of energy.

SKF intends to have 40 facilities, which are responsible for 90% of company-wide energy consumption, certified by 2014. Ennulat concludes: “In the end, we are all concentrating on the same goal, which is to achieve both environmental and economic sustainability. Energy management with Simatic B.Data makes a valuable contribution to this effort.”

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Companies in the manufacturing industries today are faced with conditions that make economical and efficient production increasingly difficult. In addition to observing environmental regulations and fulfilling standards such as ISO 50001, companies must deal with rising energy costs that are forcing higher energy efficiency and increasingly complex energy procurement processes in order to optimize energy contracts. Efficient energy data management can help with this, but the expenditures involved are usually significant. Siemens has accepted the challenge and with Energy Analytics has developed a managed service for energy data management based on the leading energy data management software Simatic B.Data. Energy Analytics offers companies of all sizes professional yet straightforward energy data management without performance compromises. “Especially customers who are still at the beginning of their energy management activities are looking for options to better analyze and graphically process their raw energy data,” explains Dr. Stephan Ihmels, who is responsible for Energy Analytics in Business Development. “With Managed Services, we are developing a simple and flexible service that will enable industrial businesses to make not only significantly more, but
also much faster and higher-quality decisions regarding their energy consumption.”

**Economical, simple, and intelligent**

To use the system, users simply connect the EnergyBox to their meter infrastructure and/or install the EnergyBox software in their own hardware – during operation. Thanks to the easy configuration and minimal training requirements, the new energy data management system can be implemented faster than conventional systems on offer. In addition, intelligent tools make it possible to evaluate the energy data in a profitable way: Energy Analytics offers regular reports that are individually adapted to the customer’s needs as well as individual analyses by experts that make cost savings possible. By choosing the matching Energy Analytics package, the users pay only for the functions they need and can gradually expand the energy data management functions if their requirements increase.

**Find the best solution with the help of experts**

A special challenge in energy data management is the development of the right measuring system, because important values are easy to overlook while unimportant ones can be overrated. This is why the experts at Siemens are working with their customers to develop special metering infrastructures and recording systems tailor made for the customers’ requirements. The data are automatically recorded and transmitted to the Siemens Energy Service Center via a secure connection. Conformity with the Siemens safety standard CERT ensures the highest degree of data security in this process. Via a web portal, the users then receive the energy reports and analyses that they can use as the basis for savings measures.

**The right energy management package for everyone**

Whether a fast and cost-effective solution or a complex and highly developed energy data management system is needed, with Siemens’ scalable, modular, and flexible service customers buy only what they really need. Users can choose from four packages: Entry, Basic, Advanced, and Professional. The Entry package makes energy consumption transparent and is based on purely manual data input. The Basic package has additional automated data entry and is suitable for users who want to introduce basic energy data management. Those who want to make cost-saving business decisions based on energy data can use the Advanced package, containing additional analyses by Siemens experts. The Professional package, which also includes analyses on the machine level, is for users who want to certify their energy data management according to ISO 50001.

**Perfect partner**

Thanks to its skilled experts, who are always up-to-date on energy engineering as well as regulations and energy policy, and its high data security standards, and thanks to saving costs, Siemens is the perfect partner for energy data management. Ihmels sums it up: "With more than 15 years of experience in energy efficiency consultation and energy data management, we are familiar with the needs and requirements of a wide variety of industries.”

**The energy data management is available for SPS IPC Drives 2013 in selected countries.**

**INFO AND CONTACT**

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Two pumps driven by servomotors supply the precise amount of oil required for the process – that is the concept of the electrohydraulic Pressdrive Servo Hybrid (PSH) hybrid drive, which reduces power consumption by up to 60%. We spoke to the head of sales and marketing at Voith Turbo H + L Hydraulic, Harald Branz, and Ingo Geier from Siemens about this innovative development resulting from a technology transfer between the two companies.

Mr. Branz, compared with similar drive systems, the PSH system significantly reduces power consumption. How did you achieve that?
Harald Branz: The key factor is the use of the right Siemens drive technology. We use servomotors from the Simotics M-1PH8 series and converters from the modular Sinamics S120 line for the direct drive of two internal gear pumps that are regulated according to the exact requirements of the press process. Two compact units consisting of a pump and servomotor supply variable volume flows, thus precisely regulating the up and down movements of the main cylinder and the slide of the press. This makes the usual valve technology unnecessary in most cases. Another factor is that there is no longer a central, continuously working pump drive, and the circulating oil volume has been drastically diminished. This usually eliminates the need for cooling, and the oil does not thermally age as quickly anymore and therefore does not need to be replaced as frequently. This significantly reduces costs over the lifecycle of the press.

What were the challenges during the development of the PSH system that Siemens and Voith had to overcome together?
Ingo Geier: We had to implement the hydraulic and process-related requirements on a powerful yet at the same time easy-to-operate control and drive system. For this, we selected a fail-safe Simatic S7-317TF technology CPU, thus dispensing with an additional safety control system. And the modular Sinamics S120 drive system connected via Profibus with the control system can be precisely adjusted to Voith’s specific requirements. All the drive components are interconnected via the digital Drive-Cliq system bus, and the motors are automatically detected by their electronic nameplate. The modular set-up and the simple basic concept of the press drive make increasing the press force easy – pump/motor units are simply added. Since hydraulic presses with the PSH drive can always be set up the same way, maintenance and spare parts management are also simplified.

Is this technology still easy to operate for the user?
Ingo Geier: Absolutely. A Simatic MP377 Multi Panel with a 15” touch display is installed at the switch cabinet for convenient control and monitoring. An easy-to-understand operator interface using Simatic WinCC flexible guides the operator through the process and visualizes all the relevant parameters. Remote access is also possible.

Are there other benefits that distinguish the PSH solution from conventional systems?
Harald Branz: Press force and slide speed are regulated directly through the speed of the pump motors, and the actual values are transmitted back to the technology CPU via the pressure and displacement sensors. The control system detects deviations from the target values and dynamically and precisely equalizes them with the Sinamics Control Unit. Force, speed, and paths can be adapted to different press processes. Path profiles that can be exactly reproduced even for high numbers of cycles also guarantee a consistently high product quality.

Safety is also very important for presses. How do you ensure it?
Ingo Geier: The additional library for the Distributed Safety package covers all the requirements with certified press safety blocks. The communication between the control system and the distributed I/O system using the Simatic ET 200S program in both standard and safety-oriented versions takes place via Profibus, the Profisafe profile, and locally via the Profibus cable.

Mr. Branz, despite all the innovation, the PSH system still works with proven standard components. What are the advantages of this?
Harald Branz: The use of standard components that are available around the clock and around the world is extremely important for an internationally oriented company such as Voith, because it ensures that spare parts are available globally at any time and thus guarantees the high availability and productivity of the presses. Also, the new drive solution usually requires significantly less space than older hydraulic systems, making it suitable for modernization measures as well.

Mr. Branz, Mr. Geier, thank you very much for speaking with us.
The new University of Television and Film building, which is both aesthetically pleasing and functional, is located right in the center of the Bavarian metropolis of Munich. “A special highlight of our educational offering is the four TV and film studios equipped with state-of-the-art lighting technology,” emphasizes professor Peter C. Slansky, head of Department II Technology at the University of Television and Film Munich. For example, instead of the halogen technology previously used, the considerably more modern and versatile LED technology was selected in the two TV studios.

Up to 200 spotlights in the four studios ensure perfect lighting and the right mood for the artistically ambitious final film products. All the technical equipment was supplied by Arri Lighting Solutions GmbH of Berlin, a company with a long tradition in camera and lighting technology. The majority of the film and TV equipment can be moved via motors from a central control room. “This is why we had to fulfill considerably higher safety standards than usual during the implementation,” explains Thomas Luther, technical manager at Arri.

**Technology with high safety requirements**

Due to the complexity resulting from the many setting and moving options of...
The MSS 3RK3 is the ideal safety solution for the University of Television and Film Munich.

One notable characteristic of MSS Advanced is that it is possible to add a turn-on delay time to any connected device by checking the appropriate box in the MSS ES software. This is very helpful at the university, since, for example, in TV studio 1, 60 frequency converters, 60 switched-mode power supply units, and 60 LED power supply units are connecting to the grid at the same time during start-up.

Safe drive technology is also integrated: Sinamics G120C frequency inverters are used for the traversing axes of the telescopes, the mobile flying equipment, and the lamp holders, which prevent unwanted starting thanks to the integrated Safe Torque Off (STO) function. An extra MSS Basic was added to the curtain-lowering mechanism for safe brake control.

Multiple diagnostic options, simple documentation

Engineering, programming, and parameter assignment are performed with the MSS ES software, which is able to evaluate and display comprehensive diagnostic information and, due to its graphical set-up, makes troubleshooting especially easy. "Because of the comprehensive diagnostic options, the service requirements of the entire plant are significantly reduced," explains Jörg Müller, studio technician at the University of Television and Film Munich. All the drives are switched via Sirius 3RA6 compact starters that deliver important diagnostic information. By accessing the compact starters via MSS, individual drives or drive groups can be switched off selectively during an emergency stop without making the entire plant currentless.

With the Safety Evaluation Tool, available online, users are also able to very easily create the documentation that has been required since the end of 2011 by the Machinery Directive. In this process, the program determines the safety level by selecting and allocating the components used.

Simple solution for complex tasks

Altogether, four full versions of MSS Advanced are responsible for the safety of the two film and two TV studios at the University of Television and Film Munich. "A comparatively simple solution for a complex requirement," conclude Luther and Müller. Professor Slansky is also pleased with the "safe" equipment he is able to provide for his students: "Only with optimal performance, including in the area of safety, is it possible to train the creative filmmakers of tomorrow."

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From dough to ready-to-bake croissant

Thanks to state-of-the-art control and drive technology, Fritsch can guarantee increased productivity and flexibility and consistently high-quality croissants at the same time. The company’s latest production line stands out due to the modular Sinamics S120 series converters and a high-performance Technology CPU, which precisely synchronizes a dozen real axes via several virtual axes at variable speed.

The processing steps – from dough cutting to turning and separating to the transfer of the ready-to-bake pieces of dough onto baking trays – demanded significant technical know-how from Fritsch.
Up to 25,000 standard or 50,000 mini croissants per hour – with these numbers, the production line of Fritsch GmbH based in Markt Einersheim, Germany, has reached a production capacity that very few manufacturers of bakery systems are able to achieve. An improvement in the Impressa croissant line made this possible. Instead of mechanically linked units, the highly flexible Fritsch MTR molding and turning system, which is driven by individual servodrives and suitable for maximum production speeds, was used here for the first time.

Cutting-edge automation

With increasing production speeds and larger amounts of dough in the system, the demands on control and drive technology increase as well. It must be possible to continue the production flow after a possible disruption at any point; however, synchronization is more challenging than with easy mechanical processes. “We have therefore been solving these demanding challenges with high-performance controls such as the Simatic S7-317T Technology CPU for several years. This is very efficient and economical,” explained Peter K. Leimeister, head of the electronic software department at Fritsch.

Consistently high quality guaranteed

The challenge faced by Fritsch GmbH lies in the steps from dough feeding to the transfer of the formed, ready-to-bake pieces of dough to the adjacent ovens and freezers. It is necessary to optimize the individual steps and harmonize them exactly. It must also be possible to easily balance possible fluctuations in the process. The entire process is controlled by a single Simatic S7-317T-2DP T-CPU, which coordinates the interaction of 12 real drive axes via several virtual axes.

The Fritsch software engineers make use of technological functions such as synchronous operation, camming, and occasionally also output cams to be able to provide optimum production conditions for different products at variable speeds, and therefore consistently high quality. “Synchronization of the cutting cam with the variable belt speed and with different tools posed the greatest challenge here,” explained Leimeister. “We used a combination of two mating cams in the Technology CPU to make the cutting tool synchronize perfectly with the conveyor belt.” The linking of the alignment belt drives at synchronous operation – where the distance between rows can be varied – ensures an exact transfer of the rolled croissants into the molds of the baking trays. The conveying system for baking trays is electronically linked with this step so that the molds are waiting under the products at exactly the right time. The motion control and technology functions are bundled in the form of PLCopen-compliant function modules in the Simatic S7 technology library, which integrates seamlessly into the Simatic Step 7 engineering system.

Drive technology from a one-stop shop

Modular Sinamics S120 converters, which communicate with the control system via isochronous Profibus, are used to translate the T-CPU’s calculations into precise movements. Isynchronous Profibus enables fast, distributed axis control in large systems. The Sinamics drive line-up features a mutual infeed unit, the so-called Active Line Module, two CU320 control units, and several power elements (single- and dual-axis motor modules). The modular structure enables quick exchange of individual components and increases the availability of the overall system. Using control, drives, and electric motors from a single supplier means perfect coordination without any interface problems – and therefore fast, smooth commissioning. The Drive-Cliq digital system bus used with all Sinamics drive components and the electronic type plate of the consistently used Simotics S-1FK7 servomotors also contribute to this easy integration.

Proven and successful collaboration

Fritsch GmbH has been working closely and successfully with Siemens for many years. A dozen Fritsch plants equipped with the Simatic Technology CPU used by leading manufacturers all over the world are proof of this success.

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“Solving demanding synchronizing challenges with high-performance controls such as Simatic S7-317T is very efficient and economical.”

Peter K. Leimeister, Head of Software Department, Fritsch GmbH
A large bakery controls several paternoster systems for spare parts via a database system. To link the database, a communication processor with a firmware expansion for Industrial Ethernet is used as a bidirectional interface between the PLC and the enterprise resource planning (ERP) level.

As a result of the company’s strong growth, Sinnack Backspezialitäten GmbH & Co. KG, based in Bocholt, Germany, had four distributed, manually managed spare part storage areas for a large number of product lines – and thus a major logistical challenge. When the company decided to move the maintenance department, the entire warehouse department was reorganized. “Rotary paternoster systems provide high storage density in little storage space,” explains Frank Bartholome, head of maintenance at Sinnack. “We were looking for a system that would enable easy searching for the required spare part, that would indicate the storage position at the respective paternoster visually, and that would be easy to handle and to maintain by our employees.”

Database controls paternoster systems

Seven paternoster systems were installed in a separate room. For the spare parts search, the existing application – an internal development based on MS Access / MS SQL Server as the database management system – is used for manual warehouse management. For control and connection of the paternoster systems, however, a different system was chosen than the facility system previously used with OLE for Process Control (OPC), in order to achieve shorter processing times and more consistent transmission of data. The new Simatic S7-300F paternoster control is linked to the database system via a CP 343-1 ERPC communication processor with the “deviceWise Embedded Edition for Simatic S7” firmware extension. Since the fail-safe Simatic controller also monitors the safety light curtains and the emergency-stop button on the paternosters via Profibus and the Profisafe profile, hardware and cabling were significantly reduced. If a spare part is needed, the maintenance

Efficient access to databases

The CP 343-1 ERPC communication processor links the Simatic S7-300 controller with the enterprise resource planning (ERP) system or manufacturing execution system (MES). In combination with a loadable firmware expansion it provides efficient access to databases via Industrial Ethernet throughout all company levels – without time-consuming programming of the control.
Note on industrial security: Suitable protective measures (including industrial security, e.g., network segmentation) must be taken to ensure the secure operation of the plant. Further information on industrial security can be found at siemens.com/industrialsecurity.
Numerous software tools support network monitoring and diagnostics during the different phases of a plant’s lifecycle. But which tool is most suitable for the requirements?

It can be expensive if a communication network breaks down, but this can be avoided if the network is constantly monitored and diagnosed. Which tool is best suited for this application depends on who is using it for what purpose and in which phase of the plant’s lifecycle.

IT tools using layer 3 switches and routers require special IT know-how and are too complex for common use in automation environments. Open-source software and freeware, however, are also inappropriate for standard use in company-wide networks. Diagnostic tools from well-known manufacturers may be a bit more expensive but they are also more reliable. These tools can be used for configuration of diagnostics and network documentation at the beginning of the plant’s lifecycle as well as monitoring and error detection during operation and maintenance.
From development and start-up ...

It must be possible to project and program PLC and fieldbus systems with the software package for network planning. Thus, the Step 7 engineering tool for Simatic controllers enables a choice of hardware devices, network definition, and the development of connections between network devices. Step 7 makes it possible to define the network parameters of the Profinet devices during the start-up phase. The tool features a topology display to visualize this.

Such basic diagnostic functions do not replace specialized, constant monitoring solutions with detailed error diagnostics, though. Corresponding tools are also used for network documentation and thus give the maintenance staff a clear impression of how the network looks at the end of the factory acceptance test.

... to operation ...

Diagnostic software for plant operation must be quick and easy to use, and it must be able to detect network problems quickly so that affected devices can be immediately repaired or replaced. Errors can be easily diagnosed directly via the web interface of the PLC or by means of what is also referred to as system error messages in the HMI/SCADA system. The integrated web technology pages provide diagnostic functions for Profinet in the network and have a defined structure. Preliminary development and programming in Step 7 Project is required for SFM functions. In the event of standard Simatic and Profinet device errors, the PLC retrieves the PLC system modules to trigger alarms, which are then indicated in the HMI/SCADA system. Such a solution is only suitable for common and static networks, however.

An OPC server solution is possible if there are other standard SNM/P/IP devices within the network. Network components are monitored here via the so-called Simple Network Management Protocol (SNMP). An SNMP OPC server enables the allocation of OPC variables with information on SNMP devices to HMI/SCADA variables. For simple, static networks, an SNMP OPC server is a reliable, cost-effective, and user-specific solution, but many HMI/SCADA engineers are not really SNMP experts and the OPC solution requires a great deal of manual work during the development phase.

A more user-friendly alternative for complex and dynamic networks is monitoring tools for industrial networks such as Sinema servers. They are also based on SNMP and can be integrated into HMI/SCADA systems, and the graphical user interface gives a good overview of the network. Sources of errors can be quickly detected thanks to a message and event system, and the user receives advice on how to best solve the problem. A database monitors and captures network errors and documents the network activity.

Functions and displays can be limited to certain users thanks to role-based user interfaces. An integrated web interface enables the user to access the system from any location within the LAN/WAN. Browser functionality can be integrated into each HMI/SCADA system thanks to the browser OCX technology.

... to maintenance and service

Maintenance and service operations leading to production downtimes must be reduced to a minimum. In the event of an error, the maintenance staff must detect the cause of the error based on the information given by the diagnostic tool and be able to react quickly. For maintenance, external companies need remote access to the network via a standard web browser. The service staff must also update the firmware versions of the network devices on a regular basis to avoid safety breaches, to remove possible firmware errors, and to archive and document all modifications made to the network. Siemens provides the right tools for this purpose and for network management during all phases of a plant’s lifecycle.

Note on industrial security: Suitable protective measures (including industrial security, e.g., network segmentation) must be taken to ensure the secure operation of the plant. Further information on industrial security can be found at siemens.com/industrialsecurity
Hermann Erkert GmbH, Germany

Masterly solution

A supplier of precision parts relies on a new AS-i master that has been added directly to a new compact control. This makes engineering and building small and medium-sized machines and plants even easier.

Hermann Erkert GmbH in Sulzbach/Murr, Germany, is a contract manufacturer primarily for the automotive industry and must make sure the right machine equipment is available for every new order. The company relies on bus technology and automation from Siemens in order to realize even complex orders. Recently, the German company developed and built an induction hardening plant for gear components and a measuring rotary transfer machine with six stations in the dispatch area for components of the diesel injection system of an engine manufacturer.

Accelerated engineering

The technicians integrated the actuators and sensors via AS-Interface, as this bus system reduces cable length, installation time, and costs. The modular Profinet-capable Simatic S7-1200 was selected as an affordable and easy-to-use compact control. TIA Portal, with its uniform engineering concept, also makes things much easier. The greatest benefit of using this control and software comes from the new AS-i master CM 1243-2 for the S7-1200. This version of the control perfectly meets the needs of the special machine manufacturer.

In addition to the device’s larger dimensions, the previous version with a separate AS-i master would also require an additional 30 V power supply unit for the AS-i bus. With the integrated version, for data decoupling it is only necessary to switch the DCM 1271 module – also newly developed – between the standard power supply unit and the AS-i line. This enables both data transfer and energy supply through the two wires in the yellow trapezoidal AS-i line. And since “everything” in the company takes place via AS-Interface, the technicians can completely forgo additional I/O modules.

Same engineering as for Profinet and Profibus

The AS-i master can be selected in the hardware manager of TIA Portal and programmed in Step 7. This means that for the first time, AS-Interface, Profinet, and Profibus can be used in the same convenient engineering framework. In case of a failure, the control receives precise diagnostic information via AS-Interface. AS-i-capable motor starters such as the Sirius M200D or the AS-i-compatible Sinamics G110D frequency inverter can also be integrated into the plant configuration without any problem.

Note on industrial security: Suitable protective measures (including industrial security, e.g., network segmentation) must be taken to ensure the secure operation of the plant. Further information on industrial security can be found at siemens.com/industrialsecurity
In Sitrain courses, participants learn how to make optimum use of the Simatic Net industrial communication components in their solutions. Courses on topics such as Industrial Ethernet, Profinet, and Profibus offer effective knowledge transfer combined with vivid, practical orientation and the highest learning efficiency.

Today, powerful communication structures play a key role in the economical and flexible implementation of automation projects. Whether the need is simply integrating a sensor or recording and transferring the quality and production data of an entire factory, Siemens industrial communication products enable the efficient integration of all company departments. Siemens Industry Training, with its training offerings on Simatic Net, imparts the necessary overview and specific industrial communication skills. During the courses, the participants not only learn planning and configuration with Simatic Net but also the use and programming of the products as well as commissioning and servicing.

Training on industrial security in Industrial Ethernet networks

Because of the growing use of Profinet and Industrial Ethernet connections all the way to the field level, security-related issues are becoming more and more important in industry. A wide range of measures must be taken to fully protect a plant. In the corresponding Sitrain training course, participants learn how to detect hazards and weak spots and thus ensure the security of both information and communication.

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<tr>
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<tr>
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With a transfer machine for passenger car door hinges, a machine tool manufacturer based in Krefeld, Germany, sets high standards in this area. An RFID solution is used to optimally monitor the processing sequences and identify the workpiece carriers.

Precision, speed, and efficiency are of utmost importance in manufacturing. This also applies to machines from Wirtz Werkzeugbau GmbH, which has specialized in high-tech production machines and automated transfer systems in recent years. One of the company's areas of expertise is the production of special-purpose machines for automotive engineering. The latest product is a transfer machine for the manufacture of passenger car door hinges.

Complex machining sequences

The transfer line is equipped with 11 stations for seven processing steps. At the first station, a robot positions one of the 42 workpiece carriers, which a second robot loads with blanks made of high-alloy steel. The parts are hydraulically clamped and then milled and drilled, among other subsequent processing steps. In addition, reamers are used for precisely sizing drill holes with a high surface quality. The different geometries of the individual parts necessitate various clamping jigs. The finished parts also receive labels before being placed in collecting bins.

Precise positioning and safe clamping

Steps that have an important effect on the speed of the machining process include the placement and securing of four blanks each in clamping jigs and the later storage of the finished parts in a hopper. Since the workpieces are small, with short processing intervals, it is important to precisely position and safely clamp the parts and to quickly eject them again at the end. That is why every tool carrier is equipped with four hydraulic clamping jigs, enabling short cycle times and high manufacturing capacities. The blanks are clamped in such a way as to not be moved by the tool cutting forces during machining.

In developing the new transfer machine, particular attention was paid to the automation technology. “Up to now, all hardware engineering and construction of the switchgear were performed by our employees,” explained managing director Thomas Wirtz. “Since projects running in parallel caused capacity bottlenecks, we charged Siemens with the delivery of all the electrical equipment, including hardware engineering. Due to the required quantity of eight million parts per year and a maximum cycle time of nine seconds for four individual pieces, only concurrently running processing sequences were considered.” Furthermore, the parts had to be securely

“With the RFID solution, we are achieving extremely high reliability in our processing sequences. In addition, they are safe and can be tracked and traced easily.”

Thomas Wirtz, Managing Director, Wirtz Werkzeugbau GmbH
clamped as quickly as possible, multiple tools loaded in parallel, and the various blanks simultaneously machined at the stations. As goods carriers are passing through the processing stations every few seconds, the requirements concerning process reliability also increased.

Smooth processing sequences thanks to RFID solution

According to Wirtz, prior to choosing RFID technology the team discussed how to mark and reliably identify the various workpiece carriers. There were several procedures available, but RFID was favored because transponder data are collected quickly, which accommodates the high cycle times of the machine. Moreover, RFID tags can be accurately read out anytime. Wirtz selected the combination of Simatic RF380R read/write devices and MDS D100 mobile data carriers. The reader seemed particularly suitable, since it can be operated with RF300-compatible tags. At the same time, it can also be used in the ISO 15693 mode with low-cost tags such as the MDS D100. “The RFID solution installed ensures safe and smooth operating sequences,” said Wirtz. “If the machine is loaded with the incorrect tools, the manufacturing sequences can be seriously disrupted and clamping jigs can even be destroyed. To eliminate these risks, the RFID system checks whether the jigs and the blanks intended for processing match, and whether they enter the machine in the correct order.” The control program knows which identification numbers to expect and immediately recognizes the workpiece carriers conveyed toward the plant.

Challenge mastered jointly

For Wirtz, the construction of the transfer machine for the production of passenger car door hinges posed a great challenge. In Siemens the managing director found a partner with expertise in all matters related to automation. The Wirtz electrical design team worked closely with the Siemens planners, and no compromise was necessary with respect to quality monitoring. “With the RFID solution, we are achieving extremely high reliability in our processing sequences. In addition, they are safe and can be tracked and traced easily. Faulty machine operations or incorrect assignments of parts are a thing of the past,” concludes managing director Wirtz.
The geometry of the door linings of passenger cars is becoming increasingly more complex, but they nevertheless must be laminated with high-quality materials. Especially for premium vehicles, this places great demands on the process engineering – for example, the heating control system, which plays an important role during the molding of the 3-D plastic parts. The plant manufacturer Kiefel has developed an economical solution.

When it comes to processing plastic sheets, Kiefel GmbH, based in Freilassing, Germany, is a major global player. The company is a renowned manufacturer of plants for joining and molding such sheets. In addition to medical engineering and the refrigeration and packaging industries, the automotive industry is one of Kiefel’s core industries. “One of our strengths is applying high-quality materials to complex vehicle geometries in the interior, such as you find in premium-brand vehicles,” explains Michael Lorenz, head of automotive electrical engineering.

Temperature is a key factor

During the development of the plants, the temperature is crucial. In some
cases, the plastic sheets are automatically deformed and then applied to the linings of vehicle doors. After the corresponding support structures have been pressed in vacuum thermoforming plants, the high-quality covering materials are laminated on top. Punching takes place in the same process cycle. “The extremely complex structures and the different covering materials that need to be processed require a great deal of experience,” stressed Lorenz. This is why the experts rely on the Siplus HCS heating control system.

Precise control with minimal effort

In a typical laminating plant, the four doors of a car body can be finished in pairs in two processing steps. In this process, the appropriate top and bottom dies are located on swiveling tool carriers. Once the target sheet temperature has been reached, the sheet is moved between the two molds and laminated in the dies with vacuum support. At an absolute sheet temperature of about 170°C, the tolerances are in the single-digit range. The molding process takes about 10 to 15 seconds. Then the water cooling in the bottom die starts the cooling process. During this time, the necessary openings can be punched. The plant has two mold aids and two punching tools. The entire cycle takes about 40 seconds.

“We use quartz heaters to heat up the sheets precisely,” explains Lorenz. The Simatic S7 controls the temperature. It transmits the adjusted values to the flexible Siplus HCS716I heating control system, which ensures the precise control of the quartz heaters in the plant. “The price/performance ratio is especially good, which is why we like to use this type of control in our plants,” says Lorenz. “The advantages compared to a conventional set-up consisting of stand-alone devices are significantly reduced assembly effort and space requirements.” The heating control system records every half wave of the system voltage and is able to regulate the current flow and thus the temperature very precisely. “This gives us the necessary flexibility when heating up the sheets for especially complex molding processes,” explains Lorenz.

Integrated diagnostic functions

In addition to the reduced assembly effort and space savings, the Siplus HCS also offers impressive integrated diagnostic functions. The system detects, for example, a voltage drop or a heater break. The power output modules are equipped with an internal temperature monitoring system for their own protection. The temperature value is transmitted to the higher control system. Should the temperature exceed a critical value, the outputs automatically switch off. Overall, the devices have proven to be straightforward both in engineering and in operation. The heating control system is integrated into the control program with the aid of GSD files – electronic device master files. To help during commissioning, Siemens delivers a sample program in the form of function blocks and data blocks that can be used in the Step 7 control program and also in TIA Portal. The desired values then only need to be parameterized. The set values and the diagnostic values are cyclically synchronized with the higher-level control through the Profibus connection on the racks. Any network voltage variations can easily be balanced through the uniform data management of the higher-level control and of the heating control system. Lorenz acknowledges that a variation in the supply voltage would have a major impact on the output of the quartz heaters. “However, with high tech in the control cabinet, we have the heating processes for high-quality finished products under perfect control,” he concludes.

Michael Lorenz, Head of Automotive Electrical Engineering, Kiefel GmbH

“With high tech in the control cabinet, we have the heating processes for high-quality finished products under perfect control.”
Siemens PLM Software has adopted a new application-based approach for product releases, which makes it easier for companies to use the Teamcenter digital lifecycle management system. Teamcenter applications are now independent of a particular version of the larger Teamcenter platform. New customer- and market-driven solutions are available up to 300% faster, as customers can now install new applications without having to upgrade the platform. This results in a faster return on investment in product lifecycle management. Siemens has also announced the availability of the new Version 10 of the Teamcenter platform.

Last year, Siemens launched a number of applications that are now compatible with different versions of the Teamcenter platform. These include Briefcase Browser for the integration of suppliers, Substance Compliance for sustainability initiatives, Product Cost Management for cost analysis over the course of a product’s lifecycle, and the Quality Management solution with corrective action and preventive action (CAPA).

“Our separation of application releases from major platform updates significantly simplifies PLM implementation for our customers and is a game change in our market,” explains Eric Sterling, senior vice president of Lifecycle Collaboration Software at Siemens PLM Software. “PLM customers need to be able to react quickly to changing demands. Our new approach to deliver targeted PLM applications that work across multiple versions of the Teamcenter platform will enable us to focus on developing applications that help transform our customers’ businesses, and allows them to more easily take advantage of the latest and best in PLM. This approach provides customers a faster return on their PLM investment and gives them the agility required to stay ahead of their competition.”

Teamcenter 10 and the Briefcase Browser, Substance Compliance, Product Cost Management, and Quality Management with CAPA applications are available now.

siemens.com/plm/teamcenter

Stöckli Swiss Sports AG uses Solid Edge

Customized skis within an hour

The Swiss ski manufacturer Stöckli Swiss Sports AG, founded in 1935, today produces 50,000 pairs of skis every year. The customers of Stöckli Swiss Sports include quite a few successful World Cup ski racers. What ensures the quality of a Stöckli ski? The skis are built by hand with a proven technique in a laborious multilayer process that also allows the company to consistently introduce innovative products to the market.

The ski manufacturer also relies on innovative technology in developing the skis, using the Solid Edge CAD program by Siemens PLM Software. “Prior to working with Solid Edge, we managed our data in an Excel file,” said Guido Steffen, a developer at Stöckli Swiss Sports. “That was very inefficient.” The company chose Solid Edge because it can directly import Excel files. Steffen has not regretted this choice. “Solid Edge is fast and precise, yet very intuitive to work with – especially for 3-D models,” he confirms. Because the company trains many young people, the clearly structured graphical user interface is very much appreciated. “Anyone who knows his or her way around the Microsoft Office programs is able to work productively with Solid Edge within a short time,” explains Steffen.

However, Solid Edge also has other advantages: it is absolutely precise, since after entering the relevant radii, every corresponding radius is generated automatically and absolutely precisely, and it is also possible to create new ski versions with the program quickly and easily. “Every ski is as unique as the skier. Before we adopted Solid Edge, it took us two days to customize a ski; today it takes barely an hour,” explains Steffen.

siemens.com/plm
At the biannual WorldSkills Competition, the greatest talents in nonacademic professions worldwide face off in a fascinating competition, which after a 40 year absence took place in Germany again this year – supported by Siemens. As a Global Industry Partner of WorldSkills International, the company equipped several disciplines with up-to-date automation and drive products.

More than 1,000 young skilled workers from 53 countries and regions competed for the coveted world champion titles at the 42nd International WorldSkills Competition, which took place at the Leipzig Trade Fair site July 2–7. The 46 professional categories included a broad range of trade and service professions as well as industrial and technical professions. The participants, all age 22 or younger, were evaluated by expert teams according to various criteria as they performed numerous demanding tasks quickly and impressively over several days.

“With this biggest educational event in the world, we want to get people excited about training and at the same time offer a forum for sharing experiences. Our goal is to increase the quality of professional education and to drive awareness of its great importance in global competition,” explains Simon Bartley, president of the nonprofit organization WorldSkills International (WSI).

Unforgettable experiences

The participants in the competition were the best of their countries in their respective fields. One of them was the 20-year-old plant electrician Paul Genin, who competed in Skill 19, Industrial Control. He and his competitors performed the task, the installation and commissioning of a...
rolling mill, with equipment supplied by Siemens. Although it was not enough for one of the first places—Filip Eng from Sweden won gold, Kazuki Yuno from Japan won silver, and Caique Faria from Brazil won bronze—it was clear to him that participating in Leipzig was worth it. “I have learned so much—not only technically and skillwise, but also how to deal with stressful situations.”

Siemens’ contribution

In addition to the Industrial Control discipline, Siemens also equipped the Electrical Installations and Polymechanics/Automation areas with up-to-date automation and drive products at WorldSkills Leipzig 2013. The company, in cooperation with the Venue Naming Right Partner DMG/Mori Seiki, also supplied the Sinumerik CNC controls for the competitions CNC Turning, CNC Milling, Manufacturing Team Challenge and the demonstration skill Plastic Die Engineering. Siemens has been a Global Industry Partner of WorldSkills International since 2010, alongside companies such as Samsung, Würth and Festo—partners that, according to Bartley, “with their world-class expertise make an important contribution to always keeping WorldSkills in touch with the requirements of the future labor market.”

Mission to educate

In the context of the Siemens Automation Cooperates with Education (SCE) program, Siemens is supporting WSI especially in the area of industrial automation, and the company also had its own booth, with the tagline “Discover your skills and opportunities together with Siemens,” where it presented sustainable training and education concepts in Germany as well as offers for integrated degree programs, a combination of studies and professional training, to the approximately 200,000 visitors. As Siemens SCE project manager Roland Scheuerer explains, “Training is our future. That is why we support the best young skilled workers with our first-rate equipment, and during the preparation phase also with training and technical support.”

siemens.com/worldskills

Product film

Easy commissioning and maintenance

The new product film on the Simatic RF600 UHF RFID system shows how the technical challenges of identification in production can be mastered successfully. The system is a comprehensive and powerful UHF portfolio with various read devices, antennas, transponders, and accessories. Perfectly suited devices are available for all conceivable applications. Commissioning and maintenance of the Simatic RF600 readers take place easily with the new Simatic RF-Diag software tool, which makes optimal alignment of the antennas possible within a very short time.

You can find the film here: youtu.be/nY4yeCne8IA

siemens.com/rfid

Events

Keep up-to-date with the latest dates and events on Totally Integrated Automation.

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Automating with SIMATIC S7-300 inside TIA Portal

Configuring, Programming and Testing with STEP 7 Professional V11

2012, 709 pages, 429 illustrations, 85 tables, hardcover
ISBN 978-3-89578-382-1
€ 69.90

This book presents a comprehensive description of the configuration of devices and network for the S7-300 components inside the new engineering framework TIA Portal. You learn how to formulate and test a control program with the respective languages LAD and FBD or STL and SCL. The book is rounded off by configuring the distributed I/O with Profibus DP and Profinet IO using Simatic S7-300 and data exchange via Industrial Ethernet.

Users of Step 7 Professional V12 will easily get along with the descriptions based on the V11. With start of V12, the screens of the technology functions might differ slightly from the V11.

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