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SIEMENS

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# advance

The magazine for Totally Integrated Automation

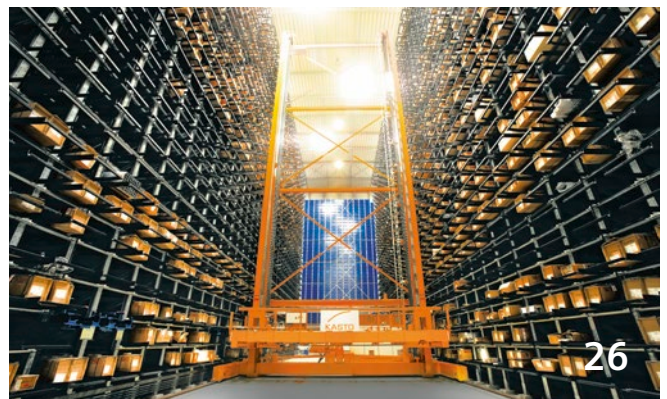
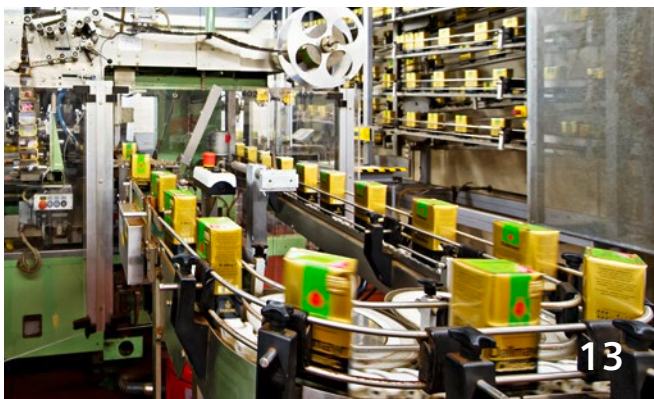
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## Merging the virtual and real worlds

Greater efficiency, productivity, and quality  
with networked solutions





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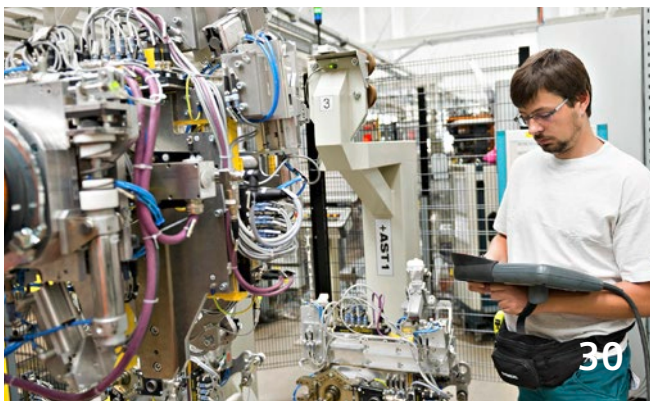
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Eckard Eberle

*“Production digitalization  
is the essential foundation  
for the Industrie 4.0 vision.”*

## Setting course for tomorrow's industry



From ever-shorter innovation cycles to more complex products and larger volumes of data, rapid changes in the industrial world present great production challenges. In order to remain competitive, companies must focus not only on achieving the highest possible plant productivity, but also on customized mass production. The key to meeting this challenge is to digitize production. This digitalization is the essential foundation for the Industrie 4.0 vision based on flexible and continuously optimized processes. Of course it will still take many years for this vision to become a reality, but the course must be set today. Every step toward Industrie 4.0 is accompanied by increases in productivity.

Siemens recognized the potential of digital solutions early on. We offer our customers a broad range of industry software solutions that enable optimum process automation across the entire value-added chain from planning to actual production to services. However, changing programming and configuration also plays an important role. The more efficient the engineering, the faster and easier the smooth interaction of automation components can be ensured. With the TIA Portal engineering framework, which unites all programming tools in a single development environment, engineering time can be reduced by up to 30%. Many OEMs and end customers, such as the machine manufacturer Reis Robotics, the coffee roastery Dallmayr, and the aluminum rolling mill Novelis, already use TIA Portal and have been won over by the integrated solution. Read more about their respective experiences starting on pages 10, 13, and 18 of this issue of *advance*.

Join us on the promising journey from today's production to Industrie 4.0. In our current issue of *advance* you will find many examples of integrated manufacturing.

Enjoy the read.

A stylized, handwritten signature in black ink, appearing to read 'Eckard Eberle'.

**Eckard Eberle**  
Head of Industrial Automation Systems





Hannover Messe 2014

# Merging the virtual and real worlds

**At the Siemens booth at Hannover Messe, visitors can follow the product development and production processes and see for themselves the new products and solutions for product design; production planning, production engineering, production execution and services. In the Future Forum area, interested persons can look into the future, as it were.**

**A**dvancing digitalization and networking, as well as the convergence taking place between the virtual and real worlds, are key drivers in the manufacturing industry. "With its Digital Enterprise Platform, Siemens is working on an overarching approach linking PLM software with engineering applications and integrated automation," explains Anton S. Huber, CEO of the Industry Automation Division. "This is the approach that will create the foundation for Industrie 4.0." With integrated software and integrated technologies, Siemens supports the entire

industrial value chain of its customers, thus enhancing their productivity and efficiency.

The integration of the product development and production lifecycles – that is, the almost parallel development of product and production environment – enables a 50% reduction in time to market.

Under the slogan "Making Things Right," the Siemens booth in Hall 9, encompassing a total area of 3,500 m<sup>2</sup>, showcases the Siemens product portfolio for industrial customers. The integrated approach addresses the entire

spectrum of product development and production processes required by industrial manufacturers.

## **Product design and production planning**

Due to strong global competition, increasing product diversity, and new technical options, innovation cycles for products of all types have been drastically shortened. Companies are increasingly using product lifecycle management (PLM) software to develop, test, and improve products virtually. They

also use industry software in production planning. Through complete simulation and optimization on the screen, it is possible to lay the foundations for a successful production process long before manufacturing operations start.

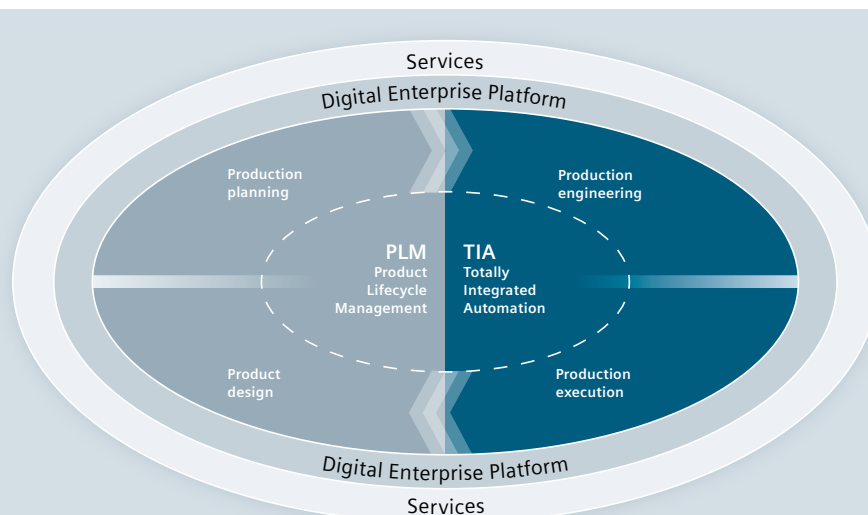
### Efficient automation with efficient engineering

Efficiency gains in the engineering process are becoming increasingly important

the additional use of efficient motors, drives, and converters. With Integrated Drive Systems (IDS), Siemens is taking its drive technology a decisive step toward the production of the future. "Seamless integration increases the availability of applications and plants to as much as 99%, and at the same time leads to maintenance cost savings of up to 15%," explains Drive Technologies Division CEO Ralf-Michael Franke. It is only with optimum dimensioning

decisions for production can then be derived. Through the selective acquisition of data and their meaningful analysis, offered services such as Energy Analytics will permit tangible energy savings. Monitoring the condition of running systems (Asset Analytics Services) in turn helps guarantee machine and plant availability. And integrated security solutions in the Industrial Security Services portfolio help protect the information and communication

The Digital Enterprise Platform enables the merging of the real and virtual worlds



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ant because the growing scope and complexity of automation processes will see the future costs of engineering spiral higher and higher. Users can consistently reduce these expenses using TIA Portal, thanks to its intuitive user interface and consistent data maintenance. "Software support for engineering processes remains one of the most important productivity levers for industry," confirms Huber. With TIA Portal, customers are able to translate the productivity gains achieved by efficient engineering into cost benefits, thus strengthening their competitiveness.

### Drive integration as a decisive factor

With Totally Integrated Automation (TIA), the fully integrated automation system from Siemens, companies are able to improve their automation solutions, regardless of the industry. The productivity and efficiency of the entire plant can be further increased with

of every component of a drive system and seamless networking with the control and production levels that smart, self-optimizing, and independently operating production sequences will become a reality.

### Increased networking allows for new service options

Due to the growing complexity and the increasing IT penetration of production, companies increasingly need services involving the analysis of production data. "We are extending our portfolio in this area, in particular in the field of remote maintenance solutions and cloud-based services," says Dirk Hoke, CEO of the Customer Services Division. Siemens is also extending its range of what it calls Data-Driven Services, with which plant owners can continuously record and analyze process and production data in real time. This allows the prediction of future developments, from which the right

technologies of industrial plants against cyber attacks from outside as well as from internal faults.

### Experience solutions of the future in the Future Forum

What will the future look like? How will we be able to shape this change successfully? With Future of Manufacturing, Future of Energy, and Future of Intelligent Infrastructure, Siemens shows its expertise in the areas of electrification, automation, and above all digitalization in the Future Forum. Here the focus is on the role of software and IT, their effects on technologies and business models, and the resulting value for the customer. In Future of Manufacturing, the fully automated assembly of car doors is shown using a car model (read more about this on p. 8).

#### INFO

[siemens.com/hannovermesse](http://siemens.com/hannovermesse)

# Automatic door installation, flexible conveyor technology

**T**he live model of a fully automated robot-based car-door-installation system is a real eye-catcher at the Siemens booth. This step in the assembly line requires particularly high precision. Even the slightest deviations when positioning the hinges become apparent later in the form of clearance between the doors and the body. A further challenge: four different automobile models might be assembled on a single line. Here, state-of-the-art automation and drive technology shows its capabilities. And there is more: an overview of Industrie 4.0 demonstrates the future of industry.

## The live model

The line consists of a flexible conveyor system and three assembly robots. A roller track conveys the body to the assembly station on a transport carriage, called a skid. An RFID reader identifies the body model. Then, a lifter lifts the body by its four corners and places it on chocks that fix the body in place in the model-specific assembly position. The exact position and alignment of the body is determined with a laser measuring system. Two robots install the hinges; a third mounts the door. After that, the roller track moves up to further transport the body.

A fail-safe Simatic S7-1518 is the central control system that coordinates the transportation system and the assembly robots. The highly compact and energy-efficient Sinamics G120D converters with efficient infeed technology are now also available with POF interfaces. The Simatic IPC677D enables intuitive multi-touch operation. The controllers, drive, and HMI are all consistently configured with TIA Portal. TIA Portal and Integrated Drive Systems – the integration of drive levels with frequency converters, motors, couplings, and gears – represent maximum engineering efficiency. “Totally Integrated Automation reduces engineering effort and costs with the efficient synergy between all automation components,” asserts Reiner Tschaban, marketing manager for TIA at Siemens.



## The digital enterprise in practice

Interactive terminals on the model show the systematic coordination of all the stages of product development and production processes and also offer a look into the future – and at Industrie 4.0.

### 1. Product design

- Make the right decisions in product planning: NX and Teamcenter make for successful product design

### 2. Production planning

- Optimize manufacturing, even before manufacturing begins: Tecnomatix software tools accelerate production planning, from design to virtual commissioning to simulation

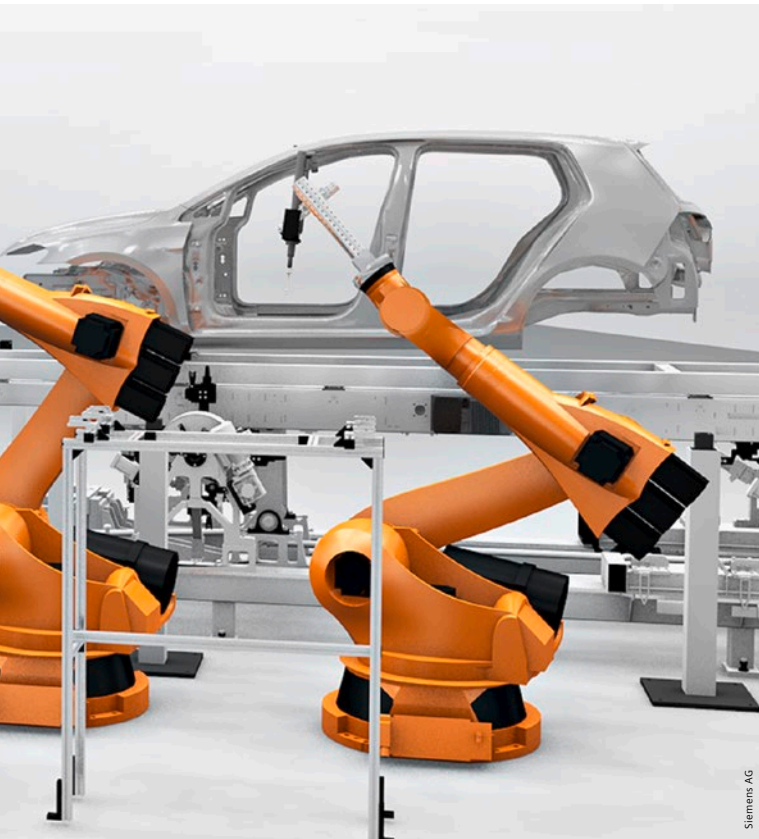
### 3. Production engineering

- Minimize engineering effort: With TIA Portal, costs can be reduced by up to 30%

### 4. Production execution

- Eliminate downtimes: The Simatic IT line monitoring system optimizes plant performance





Experience integrated manufacturing live at the Future Forum at Hannover Messe with a real model of a car-door-installation system

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- Achieve high productivity and manufacturing quality: The latest automation and drive technology, connected with Profinet, contributes to improved productivity and quality
- Energy efficiency with energy management: Reduce energy costs with increased transparency and efficient operations

#### 5. Services

- Maximize plant performance with Data-Driven services for automated data acquisition and analysis as well as comprehensive assessment to continuously identify potential for energy and resource savings, detect current and future system failures, and close potential security gaps in plants

#### 6. Industrie 4.0

- With Industrie 4.0, future challenges in production will be overcome more flexibly with cyber-physical systems. The product itself stores all the relevant information for its assembly and can communicate with the manufacturing plants

A multimedia presentation shows what is possible today with automation and drive technology. Here it becomes clear how much more flexible this line in particular is when robots know about their own capabilities and can communicate with each other. The example from the automobile industry clearly shows the path from Digital Enterprise to Industrie 4.0.

#### Energy efficiency and energy management

In this area of the trade fair, visitors can witness an interesting live experiment on energy efficiency: "How much sense does it really make to temporarily shut down parts of the plant that are not being used? How do you think this will affect the energy footprint?" To find the answer, a cell will be active for the entire duration of the trade fair, while Profenergy will switch a second cell to power-saving mode during nonproductive times, for example, at night.\*

Siemens offers energy management on all levels. Plant operators are called to attention by machine-oriented power monitoring and specific power-related key indicators. The Simatic B.Data energy dashboard shows how sustainable energy management can be implemented at the plant and technology levels and how additional potential can be unlocked with the new Energy Analytics service.

*\*The results of this experiment will be available on the internet after the trade fair at [siemens.com/advance](http://siemens.com/advance).*

Reis GmbH & Co. KG Maschinenfabrik, Germany

# Integrated efficiency



For years a German machine manufacturer has been constructing efficient and profitable production plants with minimal engineering effort using Totally Integrated Automation. This approach was also used in a fully automated line designed to cast and remove the casting cores of cylinder heads.

The centerpiece of the Reis die casting line is the three fully automated RCT 2000 double die casting machines





The casting robot uses casting ladles to scoop up material for the cylinder heads

**R**eis Robotics, a company based in Obernburg am Main, Germany, specializes in robotized production plants for a variety of sectors, with a focus on product-tailored system solutions for foundries. The experts at Reis Robotics rely on integrated automation technology from Siemens. “We obtain controllers, inverters, motors, HMI devices, and identification systems from a single source – perfectly coordinated and ready to run,” says Uwe Eich, who has managed various large-scale projects such as the realization of a fully automated die casting line for cylinder heads.

### Fully automated removal of casting cores

The main components of the line are three serially connected RCT 2000 double die casting machines that have been clocked in such a way that the following steps result in a continuous production flow. Each robot places a sand core in each of the two permanent molds of the casting machine, and then the casting robot scoops up liquid metal with two casting ladles and pours it into the molds. As soon as the material on the fringes has solidified sufficiently, the cast parts are removed from the mold and deposited in a storage facility, where they continue to cool until a data matrix code can be needled onto the surface. Once the codes have been verified, the cylinder heads can undergo further processing. In the line, the cores are destroyed with hammers in several steps, and the sand is emptied. Next, the workpieces are sent through a 20-m-long cooling tunnel, and the sprue and the remaining sand are removed. At the end of the line, the cylinder heads with cleanly removed cores are forwarded for mechanical machining.

### Reduced engineering effort

The implementation of the Totally Integrated Automation Portal (TIA Portal) introduced a new dimension in integration and thus efficiency in engineering. The intuitive engineering framework supports the graphical configuration, programming, and interconnection of a steadily increasing number of components. The experts at Reis are convinced that engineering time will be reduced by about 30%. The library concept as well as the consistent graphical programming contribute to this result, providing for the easy generation of program modules, as in user ►►

## Totally Integrated Automation

Efficient engineering is crucial for successful manufacturing. Totally Integrated Automation, industrial automation technologies from Siemens, makes engineering efficient. The open system architecture covers the entire production process and offers maximum interoperability across all automation components. This is made possible by consistent data management, global standards, and uniform hardware and software interfaces. These shared characteristics minimize engineering time. The result: lower costs, reduced time to market, and greater flexibility.

### Advantages of TIA

- Time and cost savings due to efficient engineering
- Minimized downtime due to integrated diagnostic functions
- Higher flexibility in production due to integrated communication
- Plant and network security due to integrated security functions
- Protection of personnel, machinery, and the environment with seamlessly integrated safety technology
- Improved quality due to data consistency
- Better performance due to interoperability of system-tested components

administration, for example. These can be adopted into other projects 1:1. In addition, option handling is also used with the casting machines. This means that, from a project designed for maximum configuration, the user can easily define the actually required functions via machine data and realize them without reprogramming. Thus, there is a standardized control system available for various casting machine types.

### Convenient diagnostic options

A highly cost-efficient visualization is provided by Industrial Ethernet-based thin clients in the casting line. This allows all important process data to be visualized on every PC-based system within the production network. The control systems' web servers also enable convenient diagnostics. The same applies to the stationary Simatic MV440 1-D/2-D code-reading system used to verify the needed data matrix codes.

A decisive factor in the decision to use the rugged embedded Simatic IPC227D nanobox PCs with the real-time-capable, fail-safe Soft-PLC WinAC RTX-F for the casting machines was the physically separated Industrial Ethernet and Profinet interfaces that are included in the basic setup. This enables easy separation of the company and production networks, for instance. The manufacturers from Obernburg use managed switches from the Scalance product line to structure the networks. To prevent unauthorized access, Reis uses the defense-in-depth strategy. The safety of man and machine is also extremely important, and Siemens has been following an integrated path in this respect for years, using fail-safe control systems and drive-based safety functions (Safety Integrated), for example. These too have been standard at Reis for a long time.

### Integration into the future

The managers at Reis Robotics have appreciated the advantages of integrated automation solutions ever since the first days of TIA. They will continue to rely on single-source automation components that have been perfectly aligned with each other in order to increase the productivity of the entire production process. ■

#### INFO AND CONTACT

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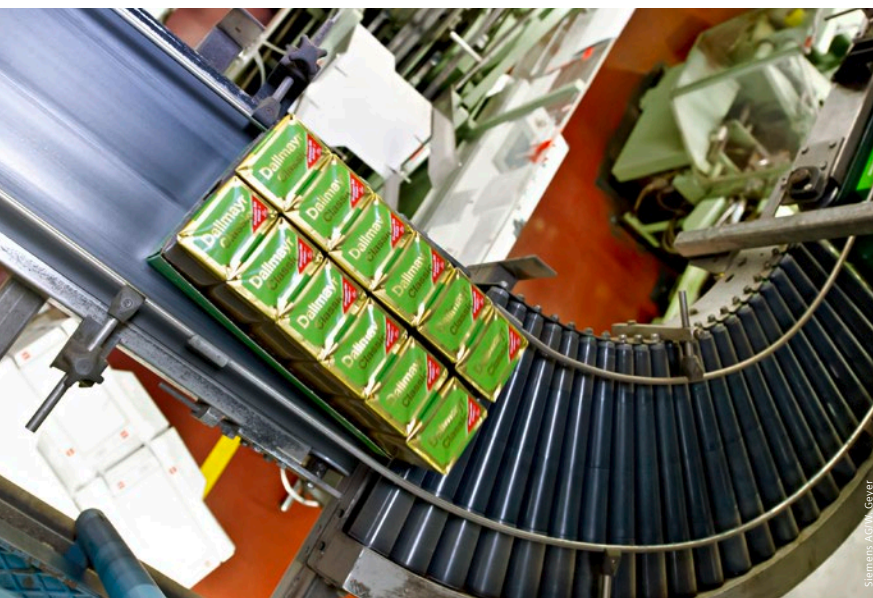
Alois Dallmayr KG, Germany

# Successful migration



In order to modernize an outdated packaging system for one of its top-of-the-line products, the well-known coffee producer Dallmayr decided to retrofit its conveyor system. The result was a resounding success and showed the efficiency of the Step 7 converter when migrating to Simatic S7-1500.

For its high-quality coffee, Dallmayr's production facilities always have the latest state-of-the-art technology – including the coffee roastery in Berlin



The conveyor system transports the coffee packages in a serpentine across the entire hall ...



One of the most popular German coffee varieties – Dallmayr Prodomo – is roasted, ground, and packaged in Berlin. To maintain the high quality standard, the producer seeks to ensure that the production facilities have the latest state-of-the-art technology. For this reason, the roasted coffee packaging system is being migrated to Simatic S7-1500.

#### Retention time for quality assurance

The pleasant smell of coffee fills the packaging facility, where bags are folded, filled, de-aerated (evacuated), sealed, and grouped into containers. The striking conveyor system is the first thing that catches the eye. It conveys the vacuum-packed coffee packages in a serpentine to just below the ceiling, where they are transported at walking speed across the entire hall; then, on the other side, they are lowered back down to working level in serpentine conveyors. The containers are grouped on a cartoning line and further conveyed to the palletizing system using a vertical conveyor provided by Nerak and other conveyors.

Dallmayr entrusted Schäfer Automatisierungstechnik GmbH with the automation of the conveying systems – from packaging to palletizing. CEO Klaus Schäfer explains the unusual arrangement: "It's all about creating retention time. If a bag is not 100% airtight, it will have enough time to draw air while it's being conveyed. The bag gets soft and can be sorted out easily." The length of the conveyor thus functions as a quality assurance mea-

sure and protects the aroma of the premium-quality coffee.

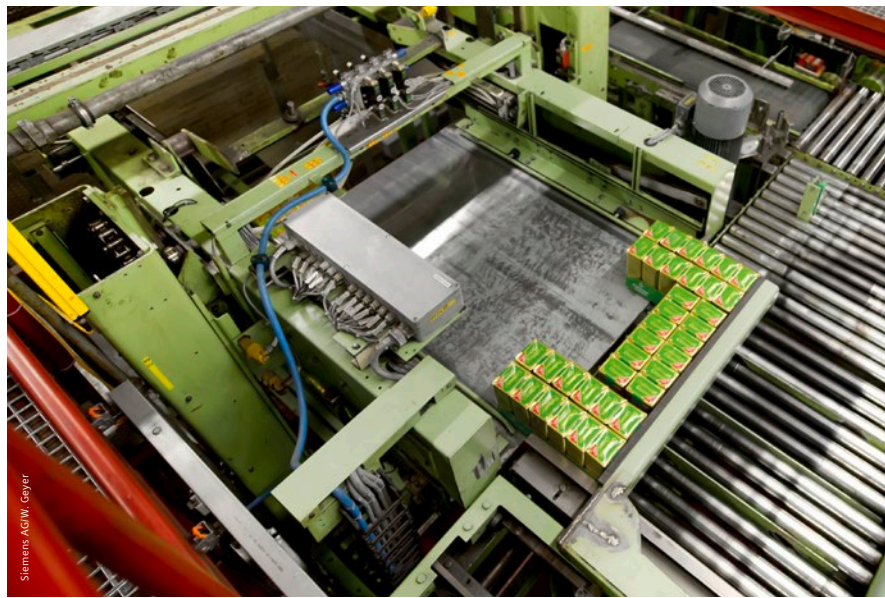
#### Retrofitting ensures supply of spare parts

Finding spare parts for the conveyor controller that was installed in the 1990s was threatening to become difficult, so the company decided to retrofit the facility. Schäfer wanted a future-oriented solution. The project team decided to use a Simatic S7-1500 controller while keeping, or rather migrating, the existing program. Previously, two Simatic S5-115U 943B CPUs controlled the two conveying lines. The distributed I/O systems were connected via an IM 308 from a third-party supplier. The wiring was to be kept but also integrated into the Simatic system. Schäfer decided to use Simatic ET 200S and therefore complemented the Simatic S7-1500 with the corresponding communication modules for Profibus DP.

#### Converters simplify migration

The team migrated the program in two steps. First, it transferred the conveyor control of the S5-115U to an S7-300 program and then converted it for use with the S7-1500. "The program for this conveying line is not too complicated, which is why we ventured to start the migration here," explains Schäfer. "Success has proven us right. The existing converters helped us save time. Today, I can definitely recommend migrating with existing S5 programs, and in the future I will also perform more





...and conveys them to the palletizing system using several conveyors

**“I can definitely recommend migrating with existing S5 programs, and in the future I will also perform more complex tasks with the S7-1500.”**

Klaus Schäfer, CEO, Schäfer  
Automatisierungstechnik GmbH



Courtesy of Klaus Schäfer

complex tasks with the S7-1500 and convert existing programs when a retrofit is needed.”

The team chose a Simatic TP1200 Comfort Panel to operate and monitor the system. An integrated Profinet interface makes it possible to easily transfer the data to a higher-level system. “That was very important for Dallmayr, because this way the company is prepared to meet any future requirements of the food and luxury food industries, such as batch tracking,” says Schäfer.

### Cooperation creates synergies

Schäfer Automatisierungstechnik was already a pilot user of Simatic S7-1500. Klaus Schäfer places great value on always offering state-of-the-art technology to his customers. His next commissioning will take place in Dubai. This does not make him anxious at all. “We can draw on the competence of Siemens’ expert services here in Berlin at any time. That gives us confidence,” he says. Holger Jost, a technical adviser in Berlin, also relishes the challenge: “We are supervising various projects that are being implemented by customers all over the world. We are proud of that, and we get to learn a lot ourselves.” This results in synergies for both sides. ■

### INFO AND CONTACT

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## Sitop UPS1600

# Integrates into any application

The Sitop UPS1600 uninterruptible DC power supply (DC UPS) offers various communication options for a controller or PC: via digital inputs/outputs, via USB, and, for the first time, even via Industrial Ethernet or Profinet. This makes the UPS particularly flexible and means that it can be integrated into virtually any automation application – whether for 24-V buffering of applications with a compact controller, with industrial PCs, or with Totally Integrated Automation (TIA).

An uninterruptible 24-V power supply protects machines and plants from power supply interruptions, thus increasing their productivity. In combination with the 24-V Sitop power supply units and the UPS1100 battery modules, UPS1600 DC UPS modules can ensure the continuous operation of an automation system for up to several hours. Thanks to the battery information transferred via Energy Storage Link, the intelligent battery management charges the battery

modules with the optimal temperature-controlled charging characteristic and gives information on the current operating and battery status. This way, the plant operator sees already in normal operation whether the UPS is ready to buffer and able to ensure 24-V buffering in case of a power failure.

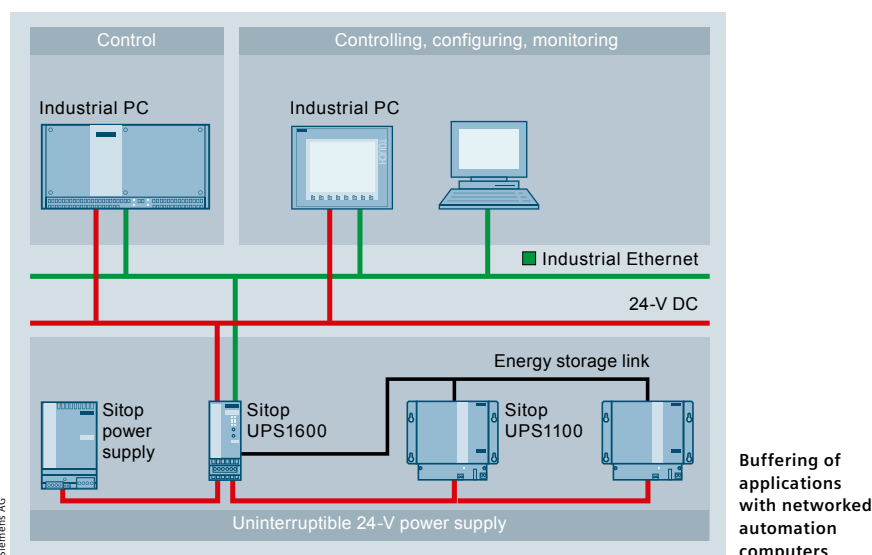
## Diagnostics instead of surprises

If a critical condition is detected, the operator is able to correct the failure in

time and avoid unpleasant surprises in case of a power failure. The precise battery diagnostics also reduce labor and costs by making preventive battery exchange unnecessary. If the AC voltage system has failed and the UPS has gone into buffering mode, the operating and diagnostics information enables the perfect response by the controller or PC, for example, in order to initiate automatic measures or to alert the operator. With the integrated digital inputs/outputs as standard and the versions with USB or Industrial Ethernet/Profinet interfaces, the UPS1600 can be integrated into all common systems. The interfaces are crucial for the diagnostics data that can be transmitted, to the ease of engineering, and to fulfilling the functional requirements of the automation system.

## The interface determines the possibilities

The most important UPS conditions, such as grid/buffering operation, ready to buffer, battery charge over 85%, or battery failure, are reported via the potential-free relay contacts. These are then evaluated by compact controls, for example, in simple automation







Siemens AG

applications. Some of the typical applications are obstruction lighting, hydraulic power plants in stand-alone operation, or combined heat and power (CHP) plants. For a CHP plant, the "start from battery" function enables the activation of the UPS in order to start the generator without grid connection.

Due to its powerful hardware with a 10-A or 20-A nominal output current, the Sitop UPS1600 with a USB interface is perfect for automation solutions controlled by an industrial PC, that is, for PC applications with low integration requirements such as biogas plants or mobile machines. All operating and configuration data are communicated via USB. Parameter configuration and visualization take place easily via the Sitop UPS Manager PC software tool.

The Sitop UPS1600 with an Industrial Ethernet/Profinet interface is the first choice for applications with automation computers and high integration requirements. This solution is usually used in networked PC-based applications, for example, in process automation. Via two ports, the UPS can be integrated directly into the LAN infrastructure where all the diagnostics data of the power supply are made available. Moreover, several PCs can be secured via UPS and

deliberately shut down in master/slave mode in case of a power failure. Using the Sitop UPS Manager, users can also display value curves of currents and voltages in diagrams.

The network-capable version of the UPS1600 for the first time enables the connection of a power supply to Profinet and complete integration in TIA. Usage areas include applications with high integration requirements, such as machine tools or processing cells in a production line, as well as the buffering of sensitive components such as pump stations. TIA Portal enables fast and easy engineering of the UPS. The evaluation of the UPS data and the integration into Step 7 user programs take place via an S7 function block available for free download. Via the UPS, entire control solutions can be buffered in case of a power failure, and several controllers can be brought into a predefined state independently of one another. ■

#### INFO AND CONTACT

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## Advantages

- Intelligent battery management:
  - Automatic recognition of the battery modules and selection of the optimal temperature-controlled charging characteristic
  - Monitoring of the operating state, battery lead-in, and battery charge condition
- High dynamic overload capability and high charging currents
- Ability to start from battery modules in the absence of supply voltage
- Availability of all diagnostics data and alarm signals via USB or Industrial Ethernet / Profinet
- Remote monitoring with integrated web server
- Sitop UPS Manager (free software download) to support configuration and monitoring for PC-based systems
- Complete integration in Totally Integrated Automation: time-saving engineering in TIA Portal
- Easy integration into user programs through Simatic S7 function blocks and WinCC faceplates (free download)

Novelis GmbH, Germany

# Comfortable temperature

During the winter, the building housing the Novelis rolling mill cools down considerably on weekends and outside operating hours. To raise the temperature to a comfortable level before the first shift starts, the company chose a heating control system with Simatic S7-1500 and TIA Portal – saving energy in the process as well.



A TP1200 Comfort Panel is installed for visualizing the building's new heating system via WinCC

**N**ovelis is the market leader for rolled aluminum products. The company delivers solutions for demanding applications in the food, automobile, architecture, and consumer electronics sectors. Among other things, aluminum trays for foodstuffs are produced in the factory located in Ohle in Plettenberg, Germany, including for the popular coffee pods. Here, the expertise consists of compliance with extremely tight tolerances regarding the material properties and material thickness of these high-quality mass-produced products.

## Proven technology innovated step by step

To achieve the highest possible availability of the huge rolling mills, master electrician Arndt Krischke relies on proven technology and innovative concepts. For example, Simatic S7-300 controllers are present in many of the control cabinets. To familiarize himself with the Simatic S7-1500, Krischke selected a project outside production: the heating of a large production facility. During operating hours, a large continuous annealing line heats up the factory building sufficiently. However,

in the fall and winter, the rooms can cool down so much at night, and especially on weekends, that the heating needs to be reliably brought up to a comfortable temperature for the employees before the first shift starts. "With the control system, we want to test not only the efficiency of the new controller but also the TIA Portal software," explains Krischke.

## Simple operation, transparent diagnostics

Viktor Otto, who was entrusted with the project, was able to complete the engineering of the heating control system within one working day. The new system regulates the gas-air ratio of the burner and the regulating flaps of the heating pipes running along the ceiling of the factory building. The control system was implemented with the easy-to-configure three-step controllers integrated into Step 7. The increased performance, the integrated display, and the optimized wiring technology of the new Simatic S7-1500 were what convinced Krischke. With the new Simatic ET 200SP, he opted for an especially compact and highly integrated distributed I/O system. The plan is to

also measure the gas flow – this is possible with the meter integrated into the S7-1500. "The option to integrate measurement directly into the automation system has many advantages. The solution is compact, and there is no extra effort required for diagnostics," says Krischke.

A Simatic TP1200 Comfort Panel is installed on the control cabinet for visualizing the building's new heating system via WinCC. The Smart Access app is a new feature with which it is possible to operate the plant via a smartphone. Otto is planning to test this – it is clear that he is having a lot of fun with this project. The company has already drawn up plans to modernize the heating control system of another rolling mill factory building with Simatic S7-1500 as well. ■

## INFO AND CONTACT

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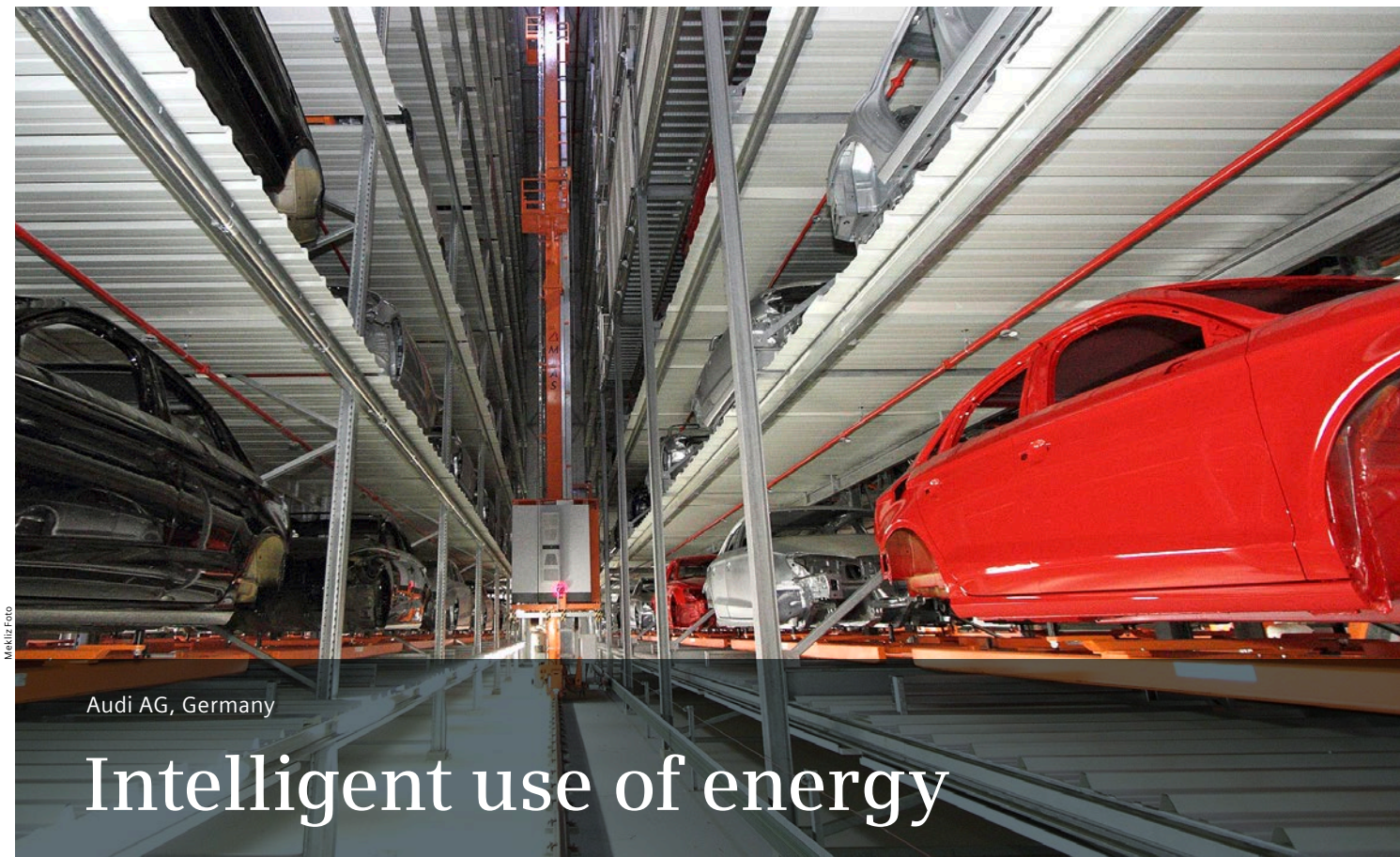


**T**oday, automobile manufacturers operate in an environment characterized by growing competitive pressure in globalized markets and increasing diversity of models. With its new high-tech plant, Audi can face this challenge with full confidence. The innovative high-bay warehouse for 411 painted and unpainted automobile bodies towers above all the other production facilities. As the central body warehouse, it has been designed to provide optimum sequences for the paint shop and assembly stations, intelligently controlling the flow of materials in the new plant. After all, the various Audi models are to be produced with the highest possible efficiency, not only in terms of productivity and plant availability, but also in terms of energy consumption.

### Manufacturer benefits from integrated drive system

"We always take a holistic approach, and that is why we have chosen to work with our long-term and experienced partner Siemens for this project," explains Wolfgang Meyerle, technical project manager for automation technology at Audi. "With optimally coordinated solutions, we are able to implement effective manufacturing logistics, increase the availability of the plants, and design production sequences that are sustainable in terms of energy consumption." Energy efficiency plays an increasingly important role not only for the automobiles themselves but also for manufacturing and production logistics. ►►

Material flow is controlled intelligently in the fully automated high-bay warehouse at the Audi plant in Győr



Audi AG, Germany

## Intelligent use of energy

The German automobile manufacturer Audi has established a production facility equipped with cutting-edge technology in the Hungarian city of Győr. One of the highlights is the fully automated high-bay warehouse that serves as a central body buffer. Advanced automation and drive technology enables high-capacity and energy-efficient production processes.





Mekitz Foto

“With optimally coordinated solutions, we are able to design production processes that are sustainable in terms of the energy consumption of our plants.”

Wolfgang Meyerle, Technical Project Manager for Automation Technology, Audi

All in all, 357 geared motors, 306 frequency inverters, and 51 motor starters are used in the high-bay warehouse and the associated conveyor technology – an integrated drive system whose efficiency the automobile manufacturer benefits from across all areas of the central body buffer.

### Using energy intelligently

Considering the great variety of types and variants of automobile models, the individual parts that constitute an automobile must be repeatedly compiled into groups in order to eventually create series for individual production steps. A central step in this process is the intermediate storage and sequencing of the bodies. In the Hungarian automobile plant, this task is performed by the fully automated high-

bay warehouse. There, energy is used intelligently. The Sinamics S120 drive system controls the individual traction, lift, and telescopic drives of the storage and retrieval machine. Due to the modular design, infeed with a controlled intermediate circuit is possible. This eliminates unwanted harmonic effects, and energy consumption can also be managed intelligently with this solution. With the Active Line Module, braking energy can be used intelligently and can be supplied to another drive that is accelerating at that point in time. This leads to compensation between the braking and driving axes. Ideally, the braking energy “commutes” between the individual drive axes and does not need to be fed back into the grid at a loss.

The modular design of the Sinamics S120 system also makes it possible to scale the drive connections

Left: The Simatic ET 200pro FC frequency inverters, protection class IP65, can be mounted in a compact manner on the conveyors

Right: The drive of the lifters to move objects over the production line uses the latest generation of Sinamics G120D-2



Mekitz Foto

of the individual axes. This type of targeted axis control minimizes inrush current peaks and relieves the load from the grid. It also makes it possible to optimize the energy consumption of the entire plant.

### Smooth flow of materials due to reliable conveyor technology

A nearly 2-km-long conveyor system links the high-bay warehouse with the body shop, paint shop, and assembly. Here, all movements are exclusively horizontal, but nonetheless equally efficient. "They are equally efficient because the drives of the conveyor belts that first convey unpainted and then painted bodies also use Siemens technology," explains Meyerle. 321 geared motors and Simatic ET 200pro FC frequency inverters are in interaction here. The latter have protection class IP65, which allows them to be mounted in a compact manner on the conveyor sections without a control cabinet. Reliability and energy efficiency are key. The system offers high plant availability because the modules can be exchanged under current and during operation. In addition, due to the inverter's regenerative feedback capability, braking energy can be fed back into the grid – energy that is not lost in the braking resistor and thus can be used effectively elsewhere.

One glance at the assembly area of the Audi plant in Győr shows that work is performed efficiently there as well, which is mainly due to intelligent motion and drive control. The lifters used to move objects over the production lines were equipped with state-of-the-art drive technology. The previous solutions with protection class IP20 were replaced by

## Efficient infeed technology with Sinamics

When powering lifting applications, centrifuges, and conveyor belts, drives must often apply the brakes on considerable masses. This releases a significant amount of braking energy that is lost without the implementation of an appropriate technical solution. Sinamics frequency inverters with regenerative feedback capability offer various infeed concepts to reuse this energy.

- **Efficient infeed for Sinamics G120D/Simatic ET 200pro FC:**  
Infeed technology reduces energy consumption by up to 40%; future-oriented and sustainable manufacturing; no external supplementary components (such as braking resistors) necessary which reduces configuration and installation time and additionally saves space
- **Smart infeed technology for Sinamics S120:**  
unregulated infeed/regenerative feedback for motion control applications
- **Active infeed technology for Sinamics S120:**  
Regulated infeed/regenerative feedback for motion control applications; optimized fail-safe system ensured by constant controlled link voltage – making the drive system insensitive to load variations; automatic compensation of capacitive or inductive idle power throughout the entire machine



the latest generation of Sinamics G120D-2 inverters. In addition to protection class IP65 and positioning capability, these compact drives also feature regenerative feedback and thus also contribute to energy-efficient production sequences.

### Efficient manufacturing processes implemented

In the new plant in Győr, Audi implemented sophisticated production logistics that satisfy the demand for effectiveness and energy efficiency. In collaboration with Siemens, this resulted in an innovative high-bay warehouse with an optimized flow of material due to well-engineered and intelligently combined drive solutions, thus enabling efficient manufacturing processes. ■

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KWS SAAT AG, Germany

# Fertile ground for energy savings

To better conserve resources, leading seed manufacturer KWS has invested in a new energy management system. The company's 55 cost centers now receive detailed and timely consumption data. This promotes even greater energy awareness.



Foodlivers - Fotolia

Sustainability, including the cultivation and production of renewable resources, is important to KWS

For more than 150 years, KWS SAAT AG, based in Einbeck, Germany, has been developing seeds. Sustainability is one of the most important goals not only for the company's core business but also when it comes to the use of energy. This is why the production, consumption, and saving of energy are so important. For example, carbon dioxide (CO<sub>2</sub>) emissions are reduced by approximately 6,500 t every year through the use of biogas. Seven combined heat and power plants – five operating with natural gas and two with biogas – supply a large share of the 50 million kWh of energy required in the plant every year. The necessary biomass comes from various energy crops.

## Projects for saving energy

In 2010, the company initiated an energy management project designed to lay the foundation for tar-

geted energy saving measures. The main goal of the project: energy and cost transparency, along with increased energy efficiency and sustainability. "There are about 630 counters in our plant through which we are able to record the consumption of electricity, heat, cold, gas, and water," explains Olaf Kurtz, head of power supply at KWS Services Deutschland. Previously, the recording of consumption was performed once a month by manual data logging in a list.

In mid-2013, KWS replaced the previous solution with the Simatic B.Data energy management system as the central recording and analysis tool for integrated energy management. "With this system, we are able not only to allocate all consumption values to the corresponding cost center by originator, but also to provide overall energy accounting of the individual electricity, gas, and heat media as well as observe the current energy flows," says project manager Sadun Demir. It took about two months to implement

**“With the new B.Data energy management system, we have created the most important prerequisite for consistent energy savings.”**

Sadun Demir, Project Manager,  
Measurement and Control Technology,  
KWS Services Germany



Siemens AG

the project on-site after planning. This included setting up the necessary hardware, addressing the process tags, and allocating and engineering all the measurement and control technology in the distributed Simatic ET 200S controls, in the Simatic WinCC control system, and in the Simatic B.Data energy management program.

### Quickly implemented energy management

The implementation of the project started with the installation of Simatic B.Data on a separate computer for the company's energy management. "Since we already manually recorded the consumption values, we were able to use the energy management system immediately," says Demir. This is possible because Siemens supplies its own handheld devices into which the values of the individual process tags read on-site can be entered. The synchronization with Simatic B.Data then takes place via a docking station.

The hardware for automating the processes was installed at the same time. The 630 process tags and approximately 1,000 fault-indicator contacts were wired to 22 distributed I/O systems of the ET 200S control. Two Simatic S7-319-3 PN/DP controls serve as master controls that communicate with the stations via Profinet and centrally merge the recorded data. Kurtz explains: "We have used the same systems as in production in order to be able to exploit the advantages of a uniform standard, such as continuity, warehousing, and service."

The information is transmitted from the master controls via Industrial Ethernet to the WinCC power rate program that was already in use for operating and monitoring individual energy users. The great advantage of this TIA (Totally Integrated Automation) set-up is that information from the field level

will go to the energy center, and targeted plant control based on energy use can also take place in the opposite direction. "This way, we can build load management in real time," explains Kurtz. This means that plants can automatically be turned off or connected as necessary in order to avoid peak loads. Another advantage of this setup is that in the event of an interruption of the data network, for example, the measured values can be buffered in the master stations – even for 8 to 12 hours for especially important process tags. This increases data security and enables uninterrupted documentation of energy data.

### Allocating power down to the cost center

The ability to map energy consumption to the existing KWS cost center structure in a highly differentiated way was an important aspect during the implementation of the energy management system. The system immediately recognizes unusual deviations in consumption and displays the results accordingly. Precise energy accounting is also possible, allowing the company to recognize deviations between the energy purchased and the energy consumed. This way, leaks in the technology can be specifically identified or invoices reviewed in the administrative office. Demir and Kurtz agree: "With the new B.Data energy management system, we have created the most important prerequisite for consistent energy savings." ■

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## Integrated Drive Systems

# Strong team



Siemens AG

Maximum reliability and consistent supply of spare parts thanks to integrated drive technology

Matching drive systems ensure high plant availability and energy savings



Siemens AG

**Integrated drive systems facilitate efficient and economical operation of pumps, fans, and compressors. The perfectly matched Simotics FD motors and Sinamics G120P frequency converters demonstrate their strengths as an Integrated Drive System (IDS) from the planning and engineering stage to operation and service.**

Siemens offers a broad range of drive systems for all applications that use pumps, fans, and compressors. Motors and drives support global standards such as IEC, UL, CCC, or ATEX and can be flexibly adjusted to all performance classes and environments. The operator is supported and advised by a team of experts from Siemens when planning the overall solution.

The Sinamics G120P frequency converters, particularly suitable for use with pump, fan, and compressor applications, work in perfect synchrony with Simotics FD motors, for example, when it comes to determining the rated pulse frequency of the converter. Full advantage can thus be taken of IDS at all stages.

### Time-saving engineering

For the greatest possible engineering efficiency, a consistent system configuration is necessary. Here, Siemens offers the possibility to configure not only the motor but also the converter using the Sizer configuration tool. Alternatively, for simple configurations, the drive components can also be configured with the DT configurator. As the coil of the motor is perfectly tailored to the converter's output currents and the voltage, oversizing the drives can be avoided. This reduces investment costs by up to 15%. In addition, quick and easy engineering with TIA Portal reduces engineering time by up to 30%.

### Energy-efficient operation

The advantages of IDS also become apparent during commissioning. Faster commissioning is possible due to the converter's preinstalled commissioning wizards, which already include specific functions for pumps, fans, and compressors as well as application macros that are available on demand. In addition, the Sinamics G120P has predefined parameters for the new Simotics FD motors that were especially developed to operate the drive. With frequency converter controls and pulse patterns that have been optimized for Simotics motors, noise emissions are reduced by more than 4 dB, lowering the costs for noise insulation. Moreover, the innovative Sinamics G120P converter technology and the matching of

the motor's rated currents with the converter's output currents help reduce motor losses by more than 10%. This leads to the highly energy-efficient operation of pumps, fans, and compressors, and costs are sustainably reduced with every operating hour. Over the service life of the plant, these savings can completely offset the acquisition investment of the drive. Compared to less energy-efficient systems, this can result in the full amortization of essential parts of the plant. Isolated motor bearings as well as a coil de-

### Highlights

- Up to 15% investment reduction by avoiding oversizing
- Increased energy efficiency, with a reduction of losses of at least 10%
- Reduced noise emissions, by more than 4 dB, which leads to reduced costs for noise insulation
- Up to 30% reduction in engineering time with quick and easy engineering in TIA Portal
- High plant availability due to longer motor service life and Drive Train Condition Monitoring

signed especially to feed the frequency converter increase the motor's service life and, consequently, plant availability. These well-matched components ensure reliable operation and high plant transparency for the operator.

### Service increases plant availability

Last but not least, operators using IDS also benefit from the single-source service concept. In addition to reduced effort when stocking spare parts and long-term spare parts availability, foresighted maintenance with Drive Train Condition Monitoring extends the service life of the motors, increasing plant availability. ■

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Kasto Maschinenfabrik GmbH & Co. KG, Germany

# More efficiency in store

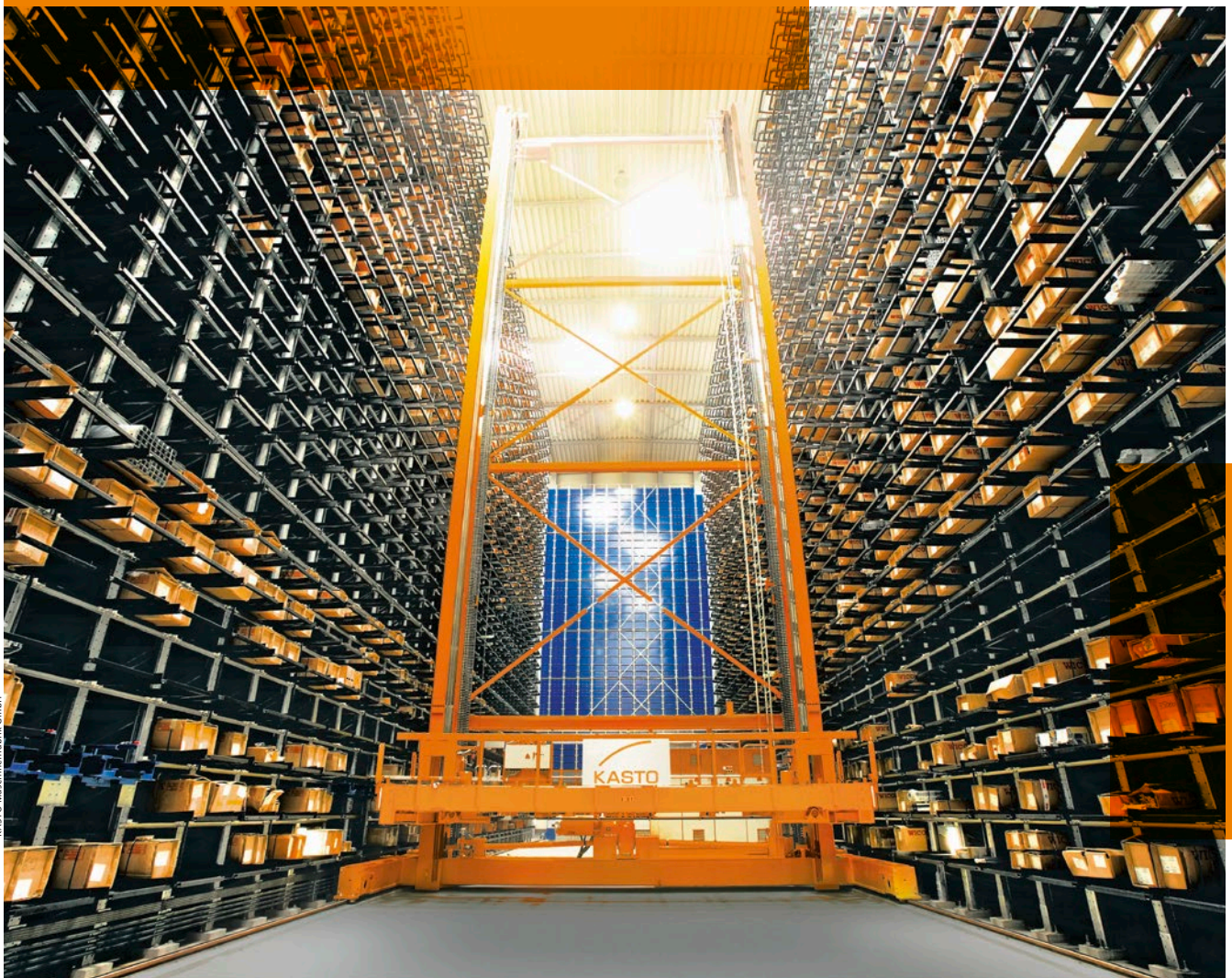
The compact design and easy operation of Sinamics S120 convinced a leading manufacturer of bar and sheet metal storage systems to move to the next generation of drives for gantry cranes. The new generation of drives leads to more efficient engineering and commissioning processes.

Storage space is valuable. In order to make the best use of it, a fully automated bar or sheet metal storage system must be rapid in its operation and customized to the user's requirements. Kasto Maschinenfabrik GmbH & Co. KG provides maximum benefit to its customers by migrating to the newest generation of drives for gantry cranes in the company's standardized bar storage system. The Sinamics S120 drive system has proven to be the best solution.

## Modular design saves effort, space, and money

The drive system has a modular design and consists of Smart Line or Active Line Modules, a control unit, and separate power units for one or two axes (single and double motor modules). The Drive-Cliq digital system bus ensures the fast connection of the drive

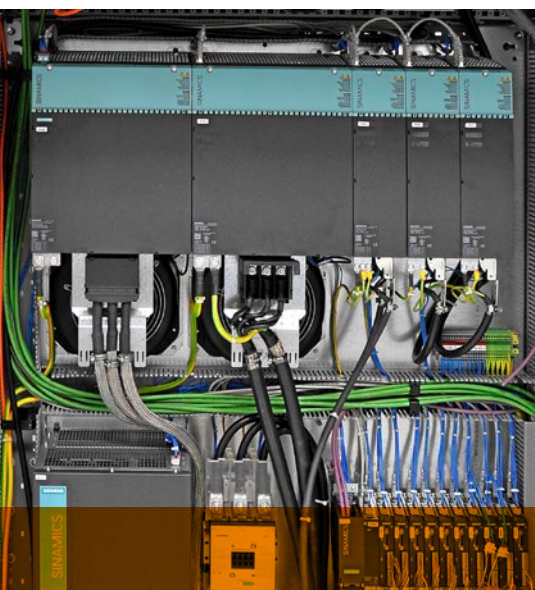
An efficient honeycomb storage system (Unigrip C series) with Sinamics S120 at Kasto



components. The modules can be combined with each other according to the relevant requirements – optimized for maximum efficiency and cost-effectiveness. The new solution also saves space in the control cabinet.

The plant manufacturer based in Achern, Germany, used the new drive system in honeycomb storage systems from the Unigrip/Unicompact series for the first time. In this type of storage system, two opposing honeycomb structures of up to 30 m height are served on the front side. The gantry crane is equipped with a chassis each on the left and on the right, a lifting device operated in the center with articulated shafts and chains, and two tensile axes to move cassettes on the crossbeam. In total, there are five controlled drive axes. The two chassis drives are positioned individually. As they are operated with a joint controlling module, they run perfectly in sync.

The modular drive system can be precisely customized to the application and saves space in the control cabinet



## Integrated engineering

Other advantages of the solution are the integrated drive engineering and end-to-end data storage in a joint project with the higher-level Simatic S7-400 application. For this purpose, Kasto has created a basic project with the five possible axes and uses a script to import the project-specific motor data. The warehouse manufacturer uses Simogear geared motors in the storage systems, thus obtaining a consistent drivetrain. This combination also enables continuous telediagnosics by the manufacturer. The lifecycle integration contributes to maximum availability, efficiency, and productivity.

## Improved cycle time

When loads need to be moved, speed will always be an important factor. In warehousing, speed, or rather handling turnover, is measured in cycles or double cycles – that is, the possible number of defined storage placements and retrievals per hour. One approach to improving cycle time is to optimize the movements of the gantry crane over a longer period of time or a larger quantity of orders. The company from Germany offers a cleverly thought-out storage management system for this. Another approach can be found in optimizing the movement cycles themselves. “In order to do this, we used all the capabilities of the new drive systems. We were able to further reduce nonproductive times and thus decrease the cycle time of our storage system by about 8%,” explains Joachim Huber, electrical engineer at Kasto.

## Saving energy during active operation

The new drive system also has a regenerative feedback capability. This not only saves space in the control cabinet but also reduces engineering and wiring effort and eliminates the need for an additional cooling system. The power from the infeed / regenerative feedback unit of the Sinamics system can be adjusted to the drive unit, enabling a cost- and energy-efficient design. In addition, a significant amount of energy is also saved during active operation. When the brakes are activated, the power units exchange the generated power among themselves through an intermediate circuit, meaning that significantly less power from the energy grid is required. Surplus energy is fed back into the grid.

## Tried and tested under real-life conditions

To date, Kasto has delivered approximately 30 storage systems with Sinamics drives to customers around the globe. Without exception, customers' experiences have been positive. Reduced engineering, hardware, and wiring effort and faster commissioning of gantry cranes have reduced costs by about 15%. The operators profit especially from the energy efficiency and the shorter cycle times. ■

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**“We have used all the capabilities of the new drive system. We were able to further reduce nonproductive times and thus decrease the cycle times of our storage system by about 8 percent.”**

Joachim Huber, Electrical Engineer, Kasto





Robert Bürkle GmbH, Germany

# Cost-efficient laminating

A modular multiaxis drive system instead of many single drives makes the multi-opening laminating lines of Robert Bürkle GmbH even more cost-efficient, as there is virtually no assembly or wiring effort and the space needed for control cabinets is reduced.

**R**obert Bürkle GmbH, based in Freudenstadt, Germany, has developed the world's first multi-opening laminating line for the photovoltaic industry. In addition to analyzing the mechanical setup of the multi-opening laminating line, the machine building company also subjected the proven individual drive system of the Ypsator series to scrutiny and replaced it with a technically and economically superior solution.

## Modularity reduces components

Bürkle opted for the modular Sinamics S120 multi-axis drive system in combination with Simotics S-1FK7 servodrive motors. This system now drives all the conveyor belts and lift drives of the Ypsator lines. Up to 60 drives are used for 4 to 10 openings. Previously, the laminating line featured a separate converter for each motor – each with a power feed, mains filter, and brake resistor, which involved increased hardware, assembly, and wiring effort.

The modular multiaxis drive system makes things much easier. The drive system of a laminating line is reduced to a single power feed, a few control groups, and the necessary number of power units, preferably the double-axis motor module version in a compact booksize format. All the drive components are linked to each other via the digital Drive-Cliq system bus and with the higher-level process control system via Profinet, reducing the wiring for drives to only a few connectors.

Up to six servo-controlled motors can be operated on each control unit. The motor modules on one CU320-2PN control unit are connected to a common intermediate circuit, which considerably reduces the number of mains filters and brake resistors. The extensive use of compact double-axis modules also saves space – equivalent to up to two control cabinets for medium-sized systems. Last but not least, the integrated communication via Profinet selected by the German machine builder eliminates limitations on the number of axes and the size of the sys-



“All drive requirements can be fulfilled with the Sinamics S120 drive system, which features a modular design and finely scalable performance.”

Harald Finkbeiner, Team Leader  
for hardware construction, Bürkle

The Ypsator multi-opening laminating line quickly established itself on the world market, thanks to its modular design

tem. And thanks to the considerably higher transmission rates, the ever-increasing amounts of data can be handled reliably as well.

### Intensive support during system change

The new drive system also integrates a number of safety functions such as Safe Torque Off, making external safety components and the corresponding wiring unnecessary. A further reduction of components, engineering effort, and therefore cost can be achieved by integrating the sequence and safety control into a fail-safe Simatic S7-300F unit. The sequence control system of an Ypsator driven in this way is a Profinet-capable Simatic S7-317-2 PN/DP PLC. Siemens developed coupling components to integrate its converters so that the proven PLC program could for the most part simply be carried over. “Siemens provided intensive support during the entire system change,” reports Michael Pojtinger, head of construction in electrical engineering at Bürkle. “With the Sinamics demo case we were able to test the desired drive functions in advance.”

An industrial PC with a Simatic WinCC user interface serves as the central visualization system, and a Simatic Mobile Panel 177 PN is used for fault elimination during operation. An additional Simatic IPC427C Microbox PC is used as a link between the automation level and the MES (manufacturing execution system) level.

### Integrated diagnostic options

The integration of control and drive systems offers a wide range of benefits throughout the entire life-cycle of the plant. “We were able to commission all



Simotics S-1FK7 servodrive motors perfectly coordinated with the Sinamics S120 drive system are now standard on all the conveyor belts of the laminating lines

the drive functions very easily with the Starter software tool,” says Harald Finkbeiner, Bürkle team leader for hardware construction. Procuring everything from a single source also enables integrated diagnostics, right down to the drive level. “All drive problems can be solved with the Sinamics S120 drive system, which features a modular design and finely scalable performance,” says Finkbeiner. There is also a first end user for the new multi-opening laminating lines: a well-known company in the United States has already implemented two lines with this innovative system.

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Škoda Auto a.s., Czech Republic

# Increasing plant availability

Škoda Auto implemented an entirely new production line with state-of-the-art technology at its plant in Kvasiny in 2001 to produce new models. An innovative maintenance program in the paint shop and final assembly ensures high plant availability and reduced maintenance costs.

Five days a week, Škoda Auto produces automobiles for the global market in three-shift operation in the Czech village of Kvasiny. The East Bohemian subsidiary of Škoda Auto looks back on a long tradition in the automobile manufacturing industry. The company's top priorities are to secure ongoing production, deliver outstanding quality, avoid downtime, and eliminate manufacturing defects.

## Guaranteed plant availability

In Kvasiny, to produce the Superb, Yeti, and Roomster models, Škoda setup a modular production line that meets the highest quality requirements and cost-effectiveness standards. Preventive maintenance measures, among other things, ensure the high quality of the production process. For maintenance tasks in the paint shop, Škoda Auto opted for Integral Plant Maintenance (IPM) from Siemens.



Every day, more than 700 automobile bodies are painted in up to 18 colors in the Škoda Auto paint shop

"More than 700 automobile bodies are painted in up to 18 colors here in the paint shop every day. The process is based on logistically sophisticated, automated technology that requires the corresponding professional and, above all, preventive maintenance measures," says Petr Peska, maintenance manager from Siemens, explaining the choice. In the paint shop and in some parts of assembly, more than 60 maintenance employees work around the clock in four-hour shifts on production plants, building technology, and ancillary systems such as compressor systems, cooling stations, and CO<sub>2</sub> fire extinguishing systems. Maintenance tasks are not limited to eliminating current malfunctions and securing production sequences, but also include planning and implementing preventive maintenance measures as well as the provision of all necessary spare parts. "With our maintenance system, we ensure a consistently high plant availability of 98%, in-

crease transparency by optimizing the cost planning and forecasting processes, and reduce maintenance costs. A computerized maintenance management system [CMMS] helps us determine key maintenance indicators and evaluate the plant's performance," explains Peska.

### Maintenance is a matter of trust

During his work, the maintenance manager gains great insight into the customer's production system. After all, he must familiarize himself in great detail with all the processes and company-specific particularities to make proposals that are measurably profitable in the end. Thus, maintenance projects require a high degree of mutual trust and an understanding of the customer's goals, together with solid industry and product knowledge as well as personal commitment.

Clear agreements are thus indispensable. Škoda Auto and Siemens have concluded a performance-based contract that grants the automotive industry customer access to Siemens' know-how in the areas of automation and drive technology, thus ensuring optimum plant availability. The maintenance manager serves as the middleman between the parties of the contract. He is in charge of ensuring that the contracted services are performed in the production plants and that the agreed key performance indicators (KPIs), such as occupational safety, quality, availability, and costs, are achieved. ■

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Siemens maintenance specialists are responsible for eliminating malfunctions, providing spare parts, and performing preventive maintenance tasks at Škoda Auto



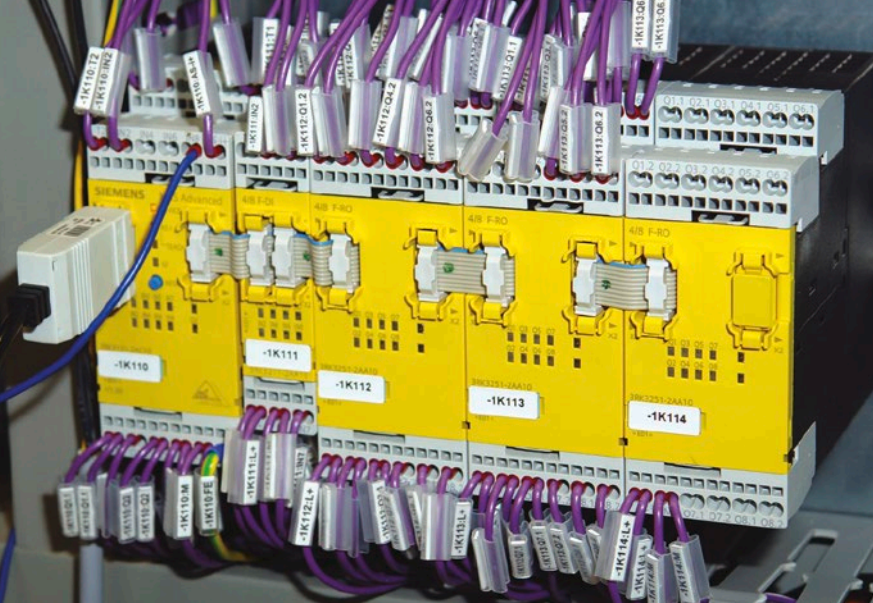
## Integral Plant Maintenance

- Tailored maintenance program, geared to a facility's specific production requirements
- Analysis of the strengths and weaknesses of the company's maintenance management as well as comparison with industry and sector standards and development of improvement measures to be incorporated into detailed implementation planning
- Development of an implementation plan and a comprehensive risk management plan

### Benefits:

- Minimized downtime
- Increased plant availability (> 98%)
- Reduced maintenance costs through continuous asset management processes
- Improved maintenance-cost monitoring and transparency with Siemens CMMS





The Sirius 3RK3 modular safety system can be directly connected to an actuator-sensor interface. Up to nine expansion units can be installed side by side on the central module

**G**EA Lyophil, a company of the GEA Group, develops and builds freeze-dryers with the corresponding loading and unloading systems (Automatic Loading and Unloading System, or ALUS) for the pharmaceutical industry in its factory in Hürth, Germany. The safety technology of freeze-drying (lyophilization) plays an important role in the pharmaceutical industry. The dehydration process

GEA Lyophil GmbH, Germany

# Safety prescribed modularly

In the pharmaceutical industry, process technology, safety, and quality awareness must be perfectly coordinated. To further improve the safety technology of its freeze-dryers, GEA Lyophil has implemented a software-based modular safety system based on ASI-safe.



takes place in injection vials, which are then sealed and packaged. Loading batches of up to 180,000 vials can take several hours.

Stopping the plant at any point must not halt the entire process, but rather the operator must decide which plant sections actually need to be shut down, depending on the requirements. "Until now, it was a very complex undertaking to individually safeguard the plant sections as well as several similar modules within a dryer by means of conventional safety technology," says Olaf Plassmann, head of electrical engineering at GEA Lyophil. "Today, though, all safety technology is easy to implement."

## Easy engineering, commissioning, and documentation

"With the software-controlled Sirius 3RK3 modular safety system (MSS), the hardware is setup simply and clearly, and the software can be parameterized easily and individually," explains Dirk Breitenbroich

The Sirius 3RK3 modular safety system is an excellent fit for the modular set-up of the GEA Lyophil freeze-dryers

of the electrical engineering department at GEA Lyophil. The technology was installed for the first time in mid-2012 in a plant consisting of three freeze-dryers and the corresponding loading and unloading systems for an operator in Slovenia. Plassmann is convinced: "The hardware set-up alone saves us a lot of time during engineering, documentation, installation, and commissioning."

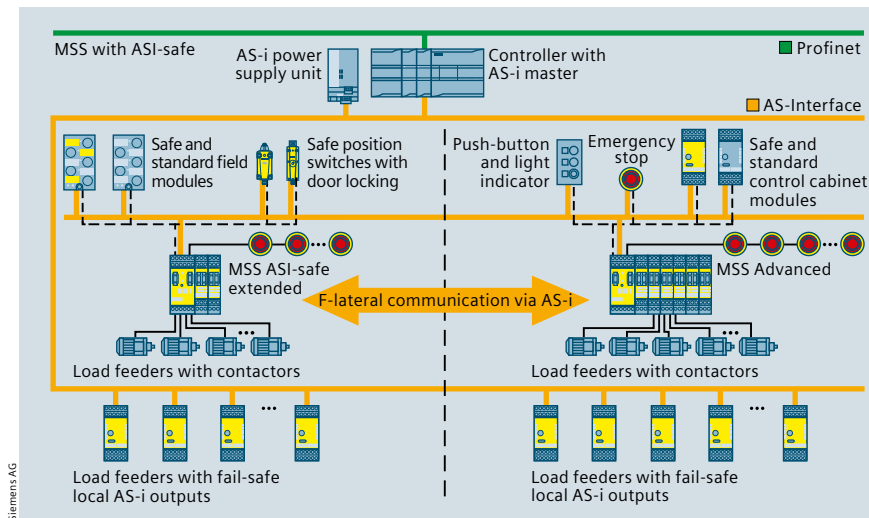
### System set-up with ASI-safe

The MSS Advanced central module can be directly connected to an actuator-sensor interface. The freeze-drying unit requires two central modules, and the ALUS one central module. All three MSS devices are connected with each other via ASI-safe. If the total plant consists of several modules, they are all linked via AS-Interface. As slaves in the AS-i network, the safety systems ensure fail-safe data exchange. The CP 343-2P communication processor serves as the AS-Interface master and is linked directly to the Simatic S7-300 controller of the ALUS.

Up to nine electronic extension modules or versions equipped with relay contacts can be installed in series on the central MSS Advanced module. Especially in freeze-dryers, this is an essential safety characteristic, as a multitude of areas must be monitored – for example, to make sure that in addition to the basic emergency stop function, the many door bolts of the vacuum chambers are also locked. The team at GEA Lyophil is happy with the simple and clear parameterization via the MSS ES software as well as the diagnostics and modification functions of the safety solution. "Dryers such as these produce pharmaceuticals in clean rooms, where even simple searches can result in very complex and costly actions," says Anne Gerlach of the electrical engineering department at GEA Lyophil. Her colleague Plassmann adds: "Operators often express additional wishes at the time of commissioning on-site, and these can be implemented much more quickly with the MSS than with conventional safety technology."

The entire safety solution can also be displayed clearly, saved, and printed. This fulfills the documentation requirements of the new European Machinery Directive. And even changes can be documented immediately and directly from the software via a Change Request Report. "We realized

already at the initial planning stage how easy the software-based safety devices are to use," says Breitenbroich. This is because there are already a multitude of important functions included in the MSS ES software, which is easily connected to the devices via drag and drop in the editor. However, the Hürth-based company also considerably simplified the electrical engineering. For the Sirius 3RK3,



The fail-safe lateral communication of the modular safety system in the AS-i network is of interest for applications with a modular set-up

all the necessary data such as connection diagrams, dimensional drawings, 3-D models, circuit diagrams of the devices, and so on, are available in the CAX Download Manager, which can be downloaded with EPLAN Electric P8 as EDZ files and transferred into the CAE program.

### Modern safety solution with great flexibility

The decision to use the Sirius 3RK3 MSS together with ASI-safe resulted in a significant improvement in the engineering and integration of the safety technology for GEA Lyophil's freeze-dryers. Plassmann summarizes: "The flexibility of the modular safety system is perfect for operators." This is because most of these dryers are being built for the global market, meaning that simplifying the dryer construction offers enormous advantages.

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Siemens AG/W. Geyer

Two important requirements during the production of coffee pods are the exact dosing of the ground coffee and the precise sealing of the soft pods

**Optima consumer GmbH, Germany**

## Nonstop coffee pods

**A new packaging plant for coffee pods fulfills several customer wishes at once: the machine is about 25% more efficient than previous plants, and it does not require an external control cabinet, as all the electrical engineering is integrated into the plant, thus saving space.**

Coffee at the press of a button – for coffee pod machines, this is the recipe for success. Every pod or soft pod is a small individual pack for ground coffee. One of the leading global manufacturers of packaging machines is Optima. The packaging division of Optima consumer GmbH in Schwäbisch-Hall, Germany, develops

machine solutions for numerous companies in the food, chemical, and cosmetics sectors. “We see a clear trend toward compact and integrated machines that contain all the required components for the automation and drive technologies as well as for the power and media supply,” says managing director Rainer Feuchter.

### **Compact and powerful**

With the new packaging system for single-portion and combination packs, the development team at Optima has designed a machine that fulfills these requirements and is setup as a modular system. The dosing and filling unit of the plant can simply be equipped

with the appropriate modules, thus allowing a wide variety of product types and sizes to be placed into the right final packaging, thanks to intelligent pick-and-place technology. CFL4-10d, the most recent machine model for soft pod packaging, is at the upper end of the performance range. The 10-row dosing unit with a double index fills 20 coffee pods in one step.

Also integrated is a foil bag unit with two rows in which the soft pods are packaged in a nitrogen atmosphere. With a required floor space of only 4.3 m by 1.2 m, the plant achieves an output of 1,500 soft pods per minute.

### Integrated automation and drive technologies

Optima is breaking new ground in several respects, as the development team confirms. The dosing unit of the plant has been completely switched over to servo technology, enabling a 25% increase in performance; at the same time, Optima is relying on an integrated Siemens solution for the automation and drive technologies, so all the electrical engineering can be accommodated in and on the machine. The machine's 52 servo-axes are controlled by

three Simotion C240 controllers for the dosing, filling, and packaging sections, and by a Simotion D435 controller for the foil bag section. Optima uses dynamic Sinamics drives both in the foil bag section and in the dosing section of the plant. The weighing station for quality control is equipped with a Simotion D410 controller. The functions of the plant are operated via a Simatic HMI IPC477C industrial PC for the foil bag section and a Simatic MP377 Touch Panel for the dosing section.

### Considerable reduction in space requirements

This was the first time Optima had used a complete Simotion solution of this complexity. The highlight of the plant is in the section that fills, seals, and weighs the soft pods – namely, in the integrated control cabinets below the machine that contain not only the controllers but also the compact Sinamics S120 booksize converters controlling the motors. The compactness continues in the process. The 20 Simotics S-1FK7 servo drives for controlling the dosing screws and tampers are installed in an extremely space-saving manner in the compact, extractable

dosing unit. The five motors are connected to the converter below the machine with a line via Drive-Clq and hub modules – another special feature, as this significantly reduces the space required for wiring.

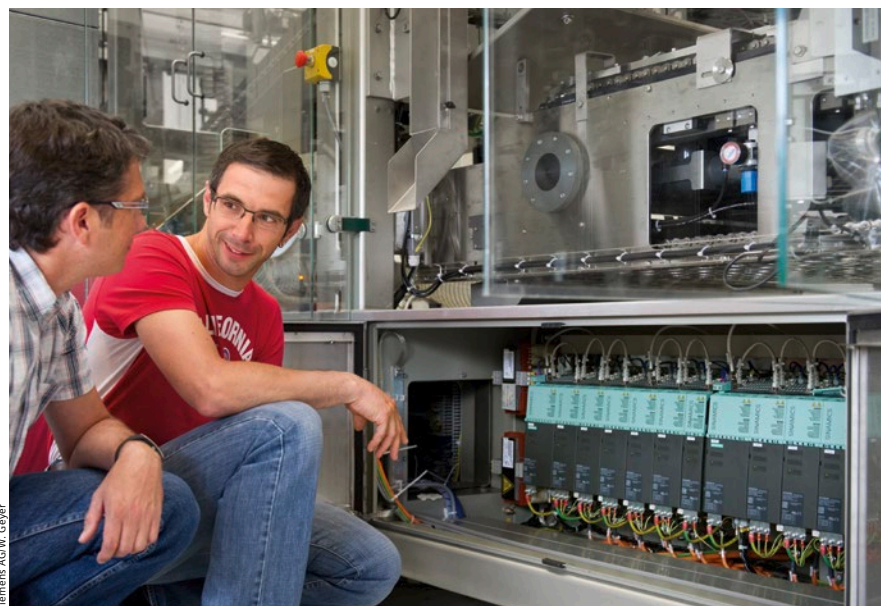
### Demand for compact machines met

For the engineering of the machine, Optima used a multicontroller approach. One functional unit within the plant is allocated to every controller in this process. This way, every programmer works on one functional section with a separate controller – an approach that fits the modular machine design perfectly. The development team is convinced that the new plant will be a success: "With this design, we meet the demand for compact, ready-to-run machines – without external control cabinets and without wiring. The drive technology makes an important contribution to this. Our customers will benefit from it!" ■

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The compact Sinamics converters controlling the motors are located below the machine in integrated control cabinets



### At a glance

- Simotion C240 for the dosing, filling, and packaging
- Simotion D435 for the foil bag control
- Simotion D410 for the weighing station
- Simatic HMI IPC for operating the foil bag section
- Simatic MP 377 Touch Panel for operating the dosing section
- Sinamics S120 booksize for controlling the motors
- Simotics S-1FK7 servomotors for controlling the dosing screws and tampers



Industrial Wireless LAN

# A wireless future for industry

Wireless LAN has by now become well established in industrial plants. It complements existing wired infrastructure, especially where laying cables is difficult or impossible, or is used with mobile devices – across a variety of industries.

There are differences between the Wireless LAN (WLAN) version that users know from home or the office and the version used in harsh industrial environments (IWLAN). When standard IEEE 802.11, on which WLAN is based, was developed, industrial requirements such as deterministic features and real-time communication were not even considered. Optimized, industry-specific extensions (iFeatures) are needed to enable WLAN to withstand harsh industrial environments.

### IWLAN in real time

If a wireless solution for an application with real-time requirements is desired, for example, based on Profinet IO, Siemens turns to the iPCF (Industrial Point Coordination Function) extension for the Scalance W700 portfolio, which ensures that each Profinet IO device can respond within its cycle time on the Profinet IO controller. Using a polling method, the access point cyclically queries each client module in its radio cell at very short intervals, and the transmission of information that is not time-critical is postponed until free cycle time is available again. This method ensures the communication in this radio cell.

### IWLAN for path-bound applications

In larger networks, however, there are multiple access points and consequently multiple radio cells between which client modules switch via a transition process called roaming. No communication takes place during roaming. To ensure that real-time messages are transmitted in time, including during roam-

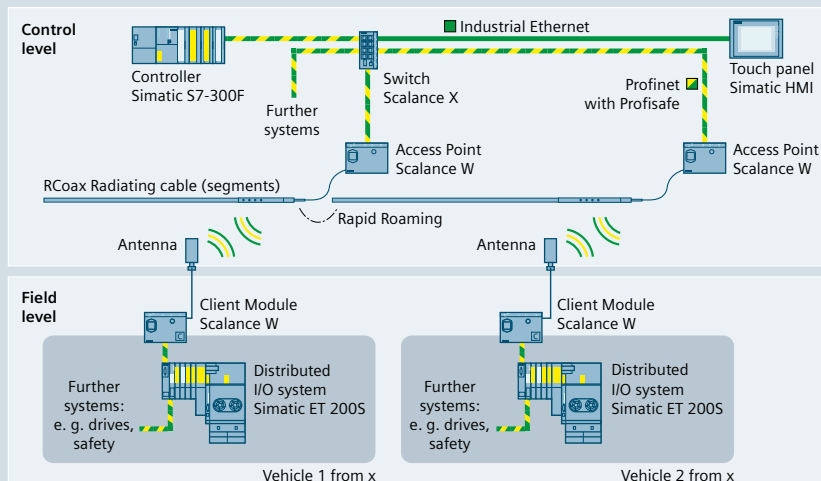
### At a glance

- iPCF (Industrial Point Coordination Function): Each Profinet IO device can respond within its cycle time on the Profinet IO controller.
- iPCF-MC (Industrial Point Coordination Function–Management Channel): An access point with two radio interfaces (dual access point) is used.
- iREF (Industrial Range Extension Function): Three different radio areas can be covered within a cell with three different antennas.
- Dual Client: Two client modules are connected in parallel with an Industrial Ethernet node.

ing, the time response has been further optimized. Moreover, if the application allows the definition of the sequence in which the various client modules roam between different radio cells, roaming times of significantly less than 50 ms can be achieved. Thanks to rapid roaming and polling, it is also possible to transfer safety-relevant information wirelessly via Profisafe in addition to Profinet IO – for example, in applications with fixed routes, such as a suspended monorail or rail-guided vehicles. The RCoax radiating cable ensures that the radio-frequency field is actually located where it is needed and with the appropriate signal strength and signal quality (dedicated radio).



Suspended monorail with IWLAN communication via RCoax radiating cables – transmission of the Profinet IO and Profisafe protocols is possible in real time due to the iPCF roaming procedure





## IWLAN for freely movable clients

Applications with freely movable wireless network devices, such as an automated guided transport system or a Simatic Mobile Panel 277F IWLAN, can make use of the iPCF-MC (industrial Point Coordination Function–Management Channel) extension, which also functions according to the polling method. iPCF-MC requires the use of an access point with two radio interfaces, known as a dual access point. One of the interfaces is used for exchanging data between the client module and the access point, and the second is used to send (broadcast) administrative messages. The second radio interface of each access point transmits on the same radio channel – called the management channel – and is setup so that the client modules can simultaneously receive administrative information from all access points within range, as soon as they are not participating in a data exchange. The wireless network node determines the best access point to connect to, based on the information received.

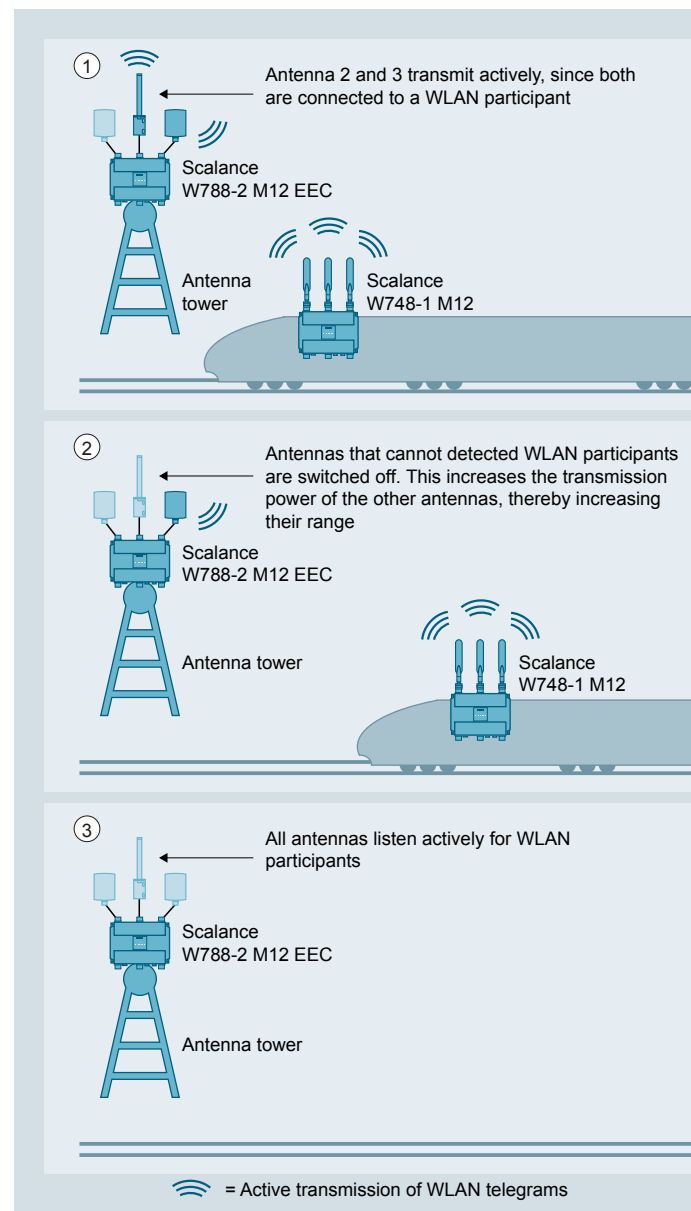
## Optimizing radio conditions

Operators also have additional requirements for IWLAN, such as minimizing the number of access points along the route and avoiding overlapping radio channels. Using an industry-specific extension, the iREF (industrial Range Extension Function), it is possible to cover three different radio areas within a cell with the three connected antennas. Consequently, the area served by an access point becomes larger. Using iREF, only the antenna with which the relevant WLAN client can best be reached is used. This reduces interference with neighboring access points, resulting in higher data throughput for the

entire system. In addition, selective transmission on the right antenna allows a higher transmitting power to be used, resulting in increased range.

The availability of wireless networks is also becoming more and more important in industrial applications. The need for high availability can best be met through the construction of a redundant wireless network. This is easy to implement with multiple coverage of the relevant communication area using different access points and through the industry-specific Dual Client extension. For this extension, two client modules are connected in parallel with an Industrial Ethernet device or even a small network.

For rail-mounted applications, a greater range can be achieved with iREF, thus reducing the number of access points



Both client modules then connect to different radio cells, with one of the client modules actively transmitting data while the other one only connects and then enters into standby mode. If the connection of the active client module is interrupted, for instance by roaming, the client module that was in standby mode takes over the active role without interrupting the data communication.

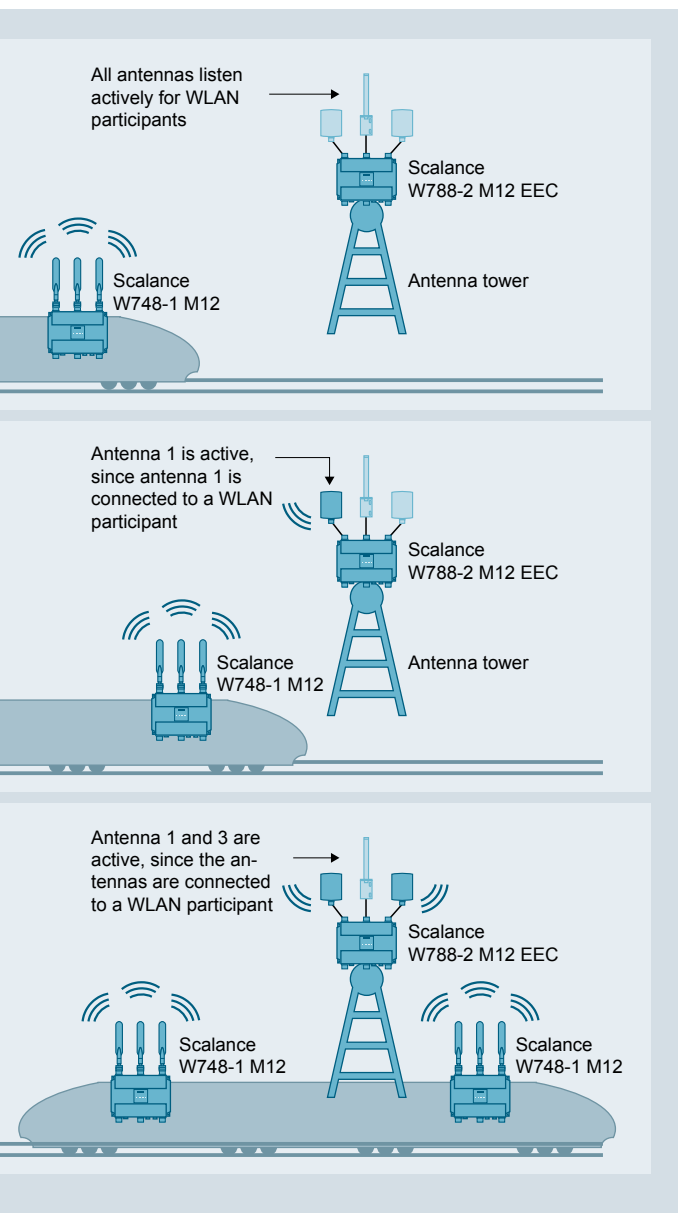
### Hardware suitable for industry

The industrial environment requires not only specific enhancements to the software; the hardware, too,

must be adapted to the environment. Outdoors, the devices must have a suitable protection class (IP65) to protect them against wind and weather. The devices should also not be accessible to the public or operable by anyone – especially with regard to possible vandalism such as cable pulling or sabotage. Indoors, the devices should be able to withstand great temperature fluctuations ( $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ ), as condensed water can accumulate in these situations and cause damage. For this reason, versions for harsh environmental conditions (Scalance W788-2 M12 EEC) with conformal coating are also available for Scalance W700. Due to the limited space, a compact design is important for installation in the control cabinet. All Scalance W devices for the control cabinet can be easily mounted either on a standard mounting rail or an S7-300/S7-1500 mounting rail.

### Always available and reliable


Operators do not need to worry about reliability or fail-safe functioning when using IWLAN in industrial environments, as IWLAN is far superior to home or office WLAN in this regard. Siemens offers a product portfolio adapted to every application, allowing a great deal of flexibility and thus providing an ideal solution for the implementation of reliable wireless infrastructure in the industrial environment. ■



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Kranbau  
Köthen GmbH

Saarschmiede GmbH Freiformschmiede, Germany

# Proven freedom of communication

During the construction of a new 12,000-t open-die forging press, wireless communication proved reliable, even under critical process conditions. At the same time, the crane control was seamlessly integrated into the process control.

Saarschmiede GmbH Freiformschmiede produces, among other things, turbine and generator shafts for power plant construction. In May 2010, one of the most advanced open-die forges in the world was inaugurated at the company's premises in Völklingen, Germany. Turbine shafts for what is called 700°C technology are being forged in the huge production facility as well. This technology will enable future power plants to achieve an efficiency of about 53% – while reducing carbon dioxide emissions by 30%. The required material properties, however, can be achieved only with open-die forges with the latest plant technology – such as that found in Völklingen.

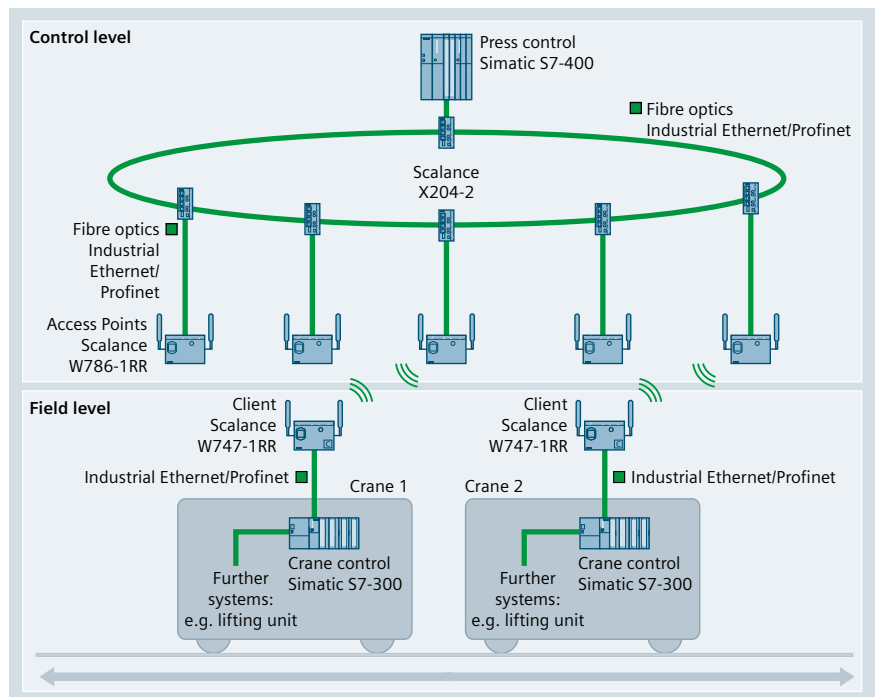
## Uninterrupted radio contact via IWLAN

A 12,000-t press is used for forging the parts. Two gantry cranes handle the workpieces and hold them in place during forming. Because the cranes are an integral part of the production process, they also must be seamlessly integrated into the process control of the press. For this, Saarschmiede relies on IWLAN, which requires uninter-

Gantry cranes transport workpieces that weigh tons

Siemens AG

To ensure that the load on the crane is not too great during machining, the crane and press controllers continually exchange measurement data, which is transmitted wirelessly via IWLAN, so that the press can be stopped if necessary



rupted radio contact between the press control and the two cranes.

When a workpiece is machined by the press and held in place by one of the cranes, the deforming forces could cause strong additional loads that exceed the maximum load-carrying capacity of the crane. In this case, the press must be shut off immediately in order to keep the 300-t crane from overloading.

### Fast response times

The crane's load is continuously recorded by sensors and transmitted to the press control. When an increasing load is detected, the press is immediately stopped. The technology behind this includes two Simatic S7-300 controllers for the cranes and a Simatic S7-400 controller for the press, interconnected via a Profinet IO coupling. The IO coupling allows for update times of 16 ms, guaranteeing a fast response.

The crane control and the forge control are connected via IWLAN. This wireless solution has been designed for maximum operational reliability. Even under the extreme environmental conditions of the open-die forge, IWLAN is the optimal solution for seamlessly and securely

connecting the cranes and the press into one functional unit. However, what appeared logical during planning proved to be extremely complex in practice.

### Stable RF field despite difficult conditions

The production facility in Völklingen is a solid steel construction, which has an extremely negative effect on the propagation of radio waves. However, optimally positioned Scalance W788-1RR access points with omnidirectional antennas provide complete radio coverage over the entire route of the cranes as well as seamless connection of the IWLAN to the Profinet network. In order to obtain a sufficiently stable RF field despite the difficult transmission conditions, the project team implemented antenna diversity at both ends of the communication line. In this case, the technicians installed two omni antennas for each transmitter or receiver in order to reduce the interference effects arising during transmission.

Because the cranes are mobile, the access points have a rapid roaming function, which uses the industrial Point Coordination Function (iPCF) and

thereby enables extremely fast hand-over.

This "iFeature" – that is, a function especially designed for industrial use – ensures that the fast response time of the Profinet I/O system is maintained under all operating conditions.

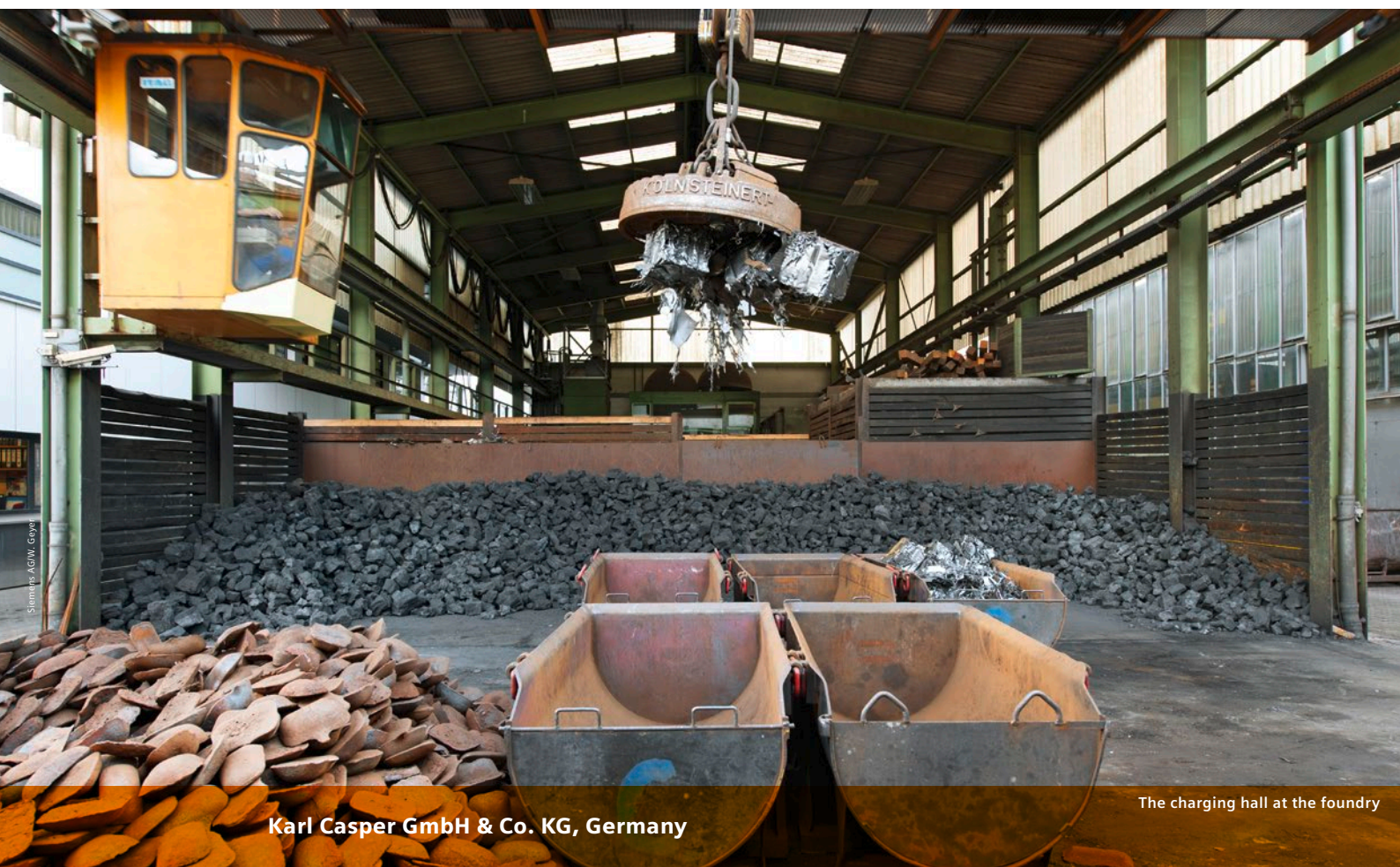
### Ready to start after comprehensive tests

Prior to commissioning the system, Siemens IWLAN specialists conducted comprehensive tests and measurements to determine the optimal coverage of the IWLAN signal, in collaboration with the Saarschmiede engineers. Several other IWLAN projects had already been successfully implemented with the same good collaboration, so the company continued to rely on the long-standing relationship with Siemens for its new forge in Völklingen, and thus on secure wireless data communication for greater freedom in process control.

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Karl Casper GmbH & Co. KG, Germany

The charging hall at the foundry

# Guardian of steel quality

Using radio-frequency identification, a foundry in southern Germany was able to optimize its manufacturing processes. The result: increased process safety, consistently accurate dosing, and continuous batch tracking.

**K**arl Casper GmbH & Co. KG, based in Germany, produces high-quality industrial and art casting goods, including components for machine tool and special machine construction from crude iron and steel scrap. "Previously, we manually recorded the data on the computer when compiling the smelting material," explains Malte Lüking, the company's technical managing director. However, RFID now allows for automatic detection of the transport containers, allocation of the batches, and software mapping of the processes.

## Increased interference immunity and mold management with RFID

During the selection and design of the hardware and software, the project team focused especially on long-term operational suitability. The RFID transponders had to be able to withstand rough handling during loading and unloading, interference fields from the powerful electromagnets attached to the crane, and continuous use, despite high furnace temperatures. A cost-effective, heat-resistant

Simatic RF680T transponder was the logical choice for labeling the charging containers. These transponders are designed for operating temperatures up to 220°C and, due to their rugged construction with protection type IP68, are ideally suited for harsh industrial environments. A Simatic RF630R read device analyzes the radio signals. A read device with an external Simatic RF640A UHF antenna is used on the top platform. The reader is connected to a PLC or a fieldbus communication module for communication and power supply.

Ten charging containers in use at Karl Casper are equipped with transponders. To charge the furnace, the crane operator selects a free charging box and fills it according to the specifications of production planning. This process must be carried out with great precision. The RFID read/write unit installed on the top platform reads the transponder data of the charging box and transmits them to the control system. The alloying components are determined during the smelting process. The software informs the smelter whether additional aggregates are required. After all the components have been smelted and mixed, the molten iron flows into a treatment ladle, where it is brought to the desired quality by adding further alloys. Then the ladle is transported to the casting hall where the molds are filled. Here, casters fill the molten iron into molding boxes.

The project team is already developing plans to expand the identification solution into mold management as well. Molds made of laminated wood, synthetic resin, or polystyrene foam are stored in the foundry's high-bay warehouse for reorders, mold changes, or mold adjustments. There are approximately 8,000 casting patterns in storage, of which approximately 4,000 are repeatedly recurring molds. In the future, every molding plate will be equipped with an RFID tag containing, among other things, component and order data, batch parts, storage location, and material. The stored data can then be read with a handheld scanner.

### Positive conclusion

The project at Karl Casper is a compelling example of the successful implementation of a continuous automation philosophy. Thanks to the complete Totally Integrated Automation product portfolio, the individual components are always matched to each other. The integrated engineering environment of TIA Portal for the PLC, HMI, and network enables great flexibility during system engineering, significantly decreasing the time needed for integration.

"Producing high-quality casting alloys requires a lot of experience, full command of all the production processes, and the optimal mixture of source materials. RFID is the right solution here and has proven itself ever since the initial start-up," says Lüking. The precise charging of the charging boxes that is enabled by the transponders helps minimize the use of

## Benefits of the RFID

- High transparency of the smelting processes
- Precise combination of the raw materials
- Error-free identification of the charging containers
- Rugged, heat-resistant transponders
- Read/write units for harsh industrial environments
- Stored information instead of manually recorded data
- Continuous traceability of all process steps
- Stable production processes
- Certified quality management

A strong metal frame protects the Simatic RF680T transponders mounted on the charging containers against mechanical loads so that even the harsh environment in the charging facility does not affect the RFID transponders



Siemens AG/ W. Geyer

resources in putting together the smelting charge. "The specifications are supplemented with the analyzed values to form a comprehensive 'batch profile,' giving information on the respective metal mixture. This allows for continuous tracking of the process steps and certified quality management," concludes Lüking. ■

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Huhtamaki Flexible Packaging Germany GmbH & Co. KG, Germany

# Well chilled despite peak loads

A great deal of cooling capacity is required for the production of food packaging made of composites. This is why the new refrigeration plants at the Huhtamaki factory in the Allgäu region of southern Germany are equipped with high-efficiency soft starters that work failure-free despite high peak loads, thus optimizing plant operation.

The Finnish company Huhtamaki Flexible Packaging produces highly technical packaging solutions for the food, nonfood, and pharmaceutical industries. Mainly high-quality, flexible packing material is produced in the factory in Ronsberg, Germany. Because it was time for a production expansion, the cooling capacity in the factory had to be significantly increased. The plastic extrusion of the film used for food packaging requires a great deal of process cooling capacity, so Huhtamaki invested in three additional refrigeration plants.

## Systematic change to soft starters

The WRK-BS-500-10-S split refrigeration machines come from L&R Kältetechnik GmbH & Co. KG, a company based in the Sauerland region of Germany. These Varicon plants operate with the refrigerant R134 A and are very energy efficient. Due to the plants' continuous four-shift operation, they achieve about 8,000 operating hours per year. This means that the individual components operate up to 3,000 hours annually. "Against this background, we had to regularly replace contactors

that handle the start-up of the motors as star-delta connections," says Jörg Duwe, an industrial engineer at Huhtamaki.

Added to this is the fact that high peak loads straining the network and causing energy costs to skyrocket can arise during the switch from star to delta connection due to the less-than-optimal setting. This is why soft starters were systematically installed as alternatives for the large motors.

However, now and again an unintentional activation occurred in the refrigeration plant when the screw compressor started up. "This is why we now use the Sirius 3RW44 High Feature soft starter there," explains Joachim Ullmann, head of electrical engineering at L&R – because the compressor units must go against a high load torque during the up to six startups per hour. The corresponding start-up behavior of the motors cannot be compared to a



The Sirius 3RW44 soft starters ensure the failure-free start-up of the screw compressors, despite their high torque

Siemens AG



The new refrigeration plants by L&R Kältetechnik with powerful motors fulfill the high production requirements at Huhtamaki

motor with a typical load. "Here, high currents flow for short periods of time that have to be 'tolerated' by the soft starter," explains Ullmann.

### Simple integration into the plant automation

"In our experience, the 3RW44 soft starters work extremely reliably and can be integrated into the overall plant control very well," continues Ullmann.

The direct integration into the plant control via Profibus allows operators to access a range of important operating, measurement, and diagnostics data as well as warning messages. Soft Starter ES parameterization software supports the use of MPI teleservice in this process for the remote diagnostics of the devices.

As preventive maintenance, it is even possible to read out and analyze statistical data.

However, the requirements for the automation technology were not quite as high for the project in the Allgäu region. There, simple parameterization via the display and the keyboard on the device was sufficient. The control itself takes place via the digital contacts on the soft starter. Start-up takes place in delta connection, which corresponds to a 1:1 output layout.

### Soft starters ensure failure-free plant operation

The investment in new split refrigeration plants has been worthwhile in the German based factory, as Huhtamaki has been able to achieve substantial energy savings thanks to the Sirius 3RW44 soft starters. However, the project team sees the greatest advantage in the fact that the devices are able to tolerate the short-time peak loads without failures, thus ensuring nonstop plant operation. ■

### Starter solution with high energy efficiency

Using the high-efficiency Sirius 3RW44 soft starter also pays off when it comes to energy efficiency. Thanks to their characteristic voltage and current curves, the devices are able to compensate for peak loads, thus reducing energy costs. The starter also has an integrated short-circuiting contact system that is activated after start-up. This eliminates the need for an external bypass contactor – yet the power loss of the soft starter is effectively minimized nonetheless. Another energy highlight: With the possible delta connection, the phases of the soft starter are switched in series with the individual motor windings. The device must then only conduct the phase current (conductor current), which corresponds to about 58% of the rated current of the motor.

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Ascutech Airlaid-Produktion GmbH & Co. KG, Germany

# The end of bearing failures

After a bearing failure caused a loss of production, Ascutech, a manufacturer of nonwoven fabric, decided to implement the Siplus CMS2000 condition monitoring system. Since then, the systematic monitoring of the bearings has been increasing the availability of the entire plant.

**A**scutech Airlaid-Produktion GmbH & Co. KG, based in Nuremberg, Germany, specializes in what is known as airlaid technology, a process used for the production of materials ranging from papers to nonwovens using cellulose. In three shifts, up to 8 t of cloth are produced per production line per day according to Ascutech customers' specifications. In this process, the raw material delivered in rolls is shredded in mills and then added to the manufacturing process in "open" form. The shredding takes place in one production line with the aid of a pin mill and in a second production line with a hammer mill. To increase the availability of the plants, the company invested in the Siplus CMS2000 condition monitoring system (CMS).

## Finding the cause with the aid of condition monitoring

A failure had preceded this decision. The shaft bearings of one of the pin mills had been replaced with new ones and properly commissioned. "An hour later, the bearings were destroyed," remembers Kurt Schrepfer, system specialist for automation technology at ATP Pöllmann, the service company responsible for the technology. The ATP specialist reacted without delay and quickly set to work identifying the cause using the Siplus CMS device. The device is able to detect the effective vibrational velocity as well as the bearing parameters, temperatures, and speeds, and, via two analog inputs, additional important values such as current, voltage, force, or flow. Warning and alarm limits can be parameterized so that corresponding signals are passed on. "You can get started with data analysis already with this low-cost device, thus determining the detailed actual condition of a plant," Schrepfer explains.

In the end, the incident at Ascutech was cleared up with the CMS device: the original replacement bearings had been built with a higher basic load rating, resulting in smaller gap widths – as well as less grease filling. "These changes resulted in a drastic increase in the temperature, which was not apparent to us," the automation specialist says.

## Easy installation of the sensors

Now the condition monitoring device has also been connected to the hammer mills, which turn at significantly higher speeds. There, it measures the temperatures and vibrations of the bearings. The

A typical application for condition monitoring: the bearings of the large, fast-turning rolls are subject to especially high loads



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“With a well-thought-out condition monitoring system, changes can be detected and dealt with immediately, before they can severely impair production processes.”

Kurt Schrepfer, System Specialist for Automation Technology, ATP Pöllmann

installation required only the appropriate threads for the sensors in the bearing blocks. The digital output of the CMS2000 was then connected to the input of the Sirius 3RW40 soft starter in a fail-safe manner via a Sirius 3TK28 safety relay. An alarm signal is given at a temperature of 70 °C, and a warning at 90 °C. The CMS then shuts down the mill operation directly via the safety relay in order to prevent the bearing temperature from continuing to rise.

The importance of condition monitoring soon became evident at a hammer mill as well. The temperature of both bearings increased suddenly and was immediately reported by the CMS device. The reason: a filter below the hammer mill had become clogged with material, resulting in changed force ratios in the bearings and ultimately in the temperature increase. “This shows that with a well-thought-out condition monitoring system, changes can be detected and dealt with immediately, before they can severely impair production processes,” Schrepfer concludes.

### Increasing availability and profitability

The Siplus CMS2000 was simply plugged onto the standard mounting rail in the on-site switchbox of the hammer mill and connected. The CMS2000 basic device has two reception channels, for the machine vibrations (RMS) and for the bearing monitoring (DKW). The detailed failure detection takes place via frequency-selective diagnostics. In addition, the device can be extended with temperature modules from the Simocode family. This is an ideal solution for Schrepfer: “With a condition monitoring system like this, we always know how our plants are doing and are able to plan service activities based on the actual condition. This saves time and money. In addition, we increase the availability of the plants, which has a positive effect on profitability.” ■

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## New Sitrain training methods

# Remote-control training

Siemens Industry Training is breaking new ground when it comes to developing training methods. Two currently still distinct approaches using new technologies will make it possible in the future to offer training courses where it was previously extremely difficult or impossible to do so.



**E**ight Simatic training devices and drives with two or three training stations are available in Biel, Switzerland. The goal is to offer advanced control engineering training in the context of the Solution Partner program. That is nothing unusual, really. But trainer Michael Jantzon and the course participants are not in Switzerland at the training devices. They are in Istanbul.

## Real device training

How is this possible? With remote control. Course participants can use the training software from anywhere in the

world as usual and do not even perceive that they are connected with the remote-controlled and camera-monitored training device via gateway. The data are transferred to the users via VPN. However, this is not a simulation; it is real training on actual devices. Image and acoustic signals are transmitted – participants can even hear the sound of fans.

The Swiss technical college Höhere Fachschule für Technik Biel (HFT Biel) and its mechanical engineering and systems engineering programs jointly designed the remote-control training course with Siemens. This method is suitable for certain target groups. Engineers, project planners, and programmers, for example, need only a working software environment for their training. Service technicians and maintenance staff, in contrast, are dependent on locally available hardware. Usually, remote-control training is of little use in such cases. However, considering the huge Sinumerik cabinets that would need to be transported from one place to another, the advantages of this new method become clear.

## PC simulation

Another variant of training with remote access, currently being offered only in the United States, is instructor-led online training. In this case, the participants are in different locations and learn, for example, at home or in their offices. They hear and see the trainer's presentation on their computer screens. Hardware is immaterial, as all the exercises are available as simulations. The daily unit of the weeklong training course takes just two hours to complete. However, the participants can access the software and hardware simulation and practice 24 hours a day. Currently, two introductory courses on the Simatic PLC are being offered.

These new approaches cannot and are not meant to replace face-to-face training – that is, the direct contact between trainer and participants – but they can complement the training portfolio in a useful way. ■



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Simatic training devices in Biel, Switzerland; the participants were in Istanbul

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## Sitop selectivity modules

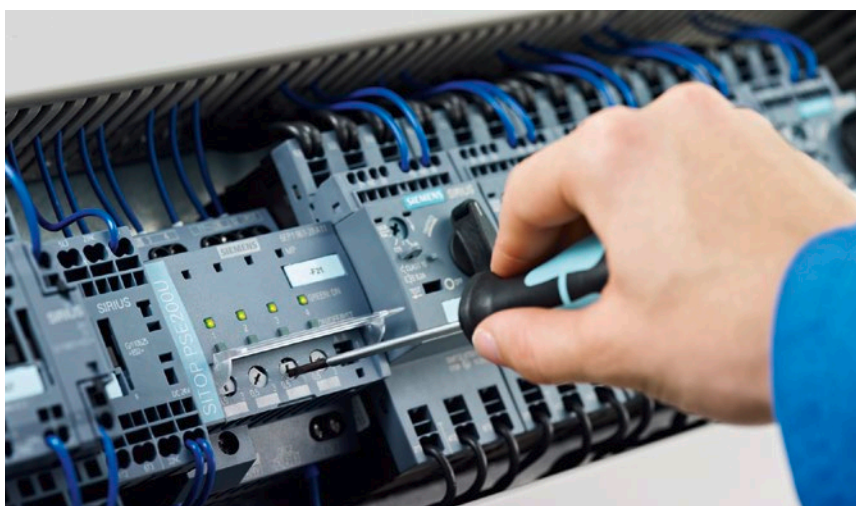
# Application examples for Simatic S7 and Simotion

The Sitop PSE200U selectivity modules are the optimal addition to all 24-V power supplies in order to distribute the load current onto several current circuits and reliably monitor them for overload and short-circuit faults. The modules permit short-term peak loads, for example, due to a high starting current, and they isolate load circuits in the event of an extended overload. This is ensured even on high-resistance lines and in the event of "creeping" short circuits. In such cases, miniature circuit breakers fail to trip, or trip too late, even if the power supply unit could deliver the required tripping current. The intact load circuits continue to supply the selectivity modules with 24 V without interruption or interaction whatsoever, thus avoiding a total failure of the system.

In versions with single-channel signaling, the status evaluation of the circuits takes place through a single digital input in the control system. Users can download free application examples for easy integration into automation with Simatic S7-300/400/1200/1500 as well as with Simotion CPUs. The application examples con-

tain the description and the function block as well as programs with evaluations in the control system, and the visualization on a Simatic panel, and they can provide ideas or serve as the basis for optimised own solutions.

[siemens.com/sitop-select](http://siemens.com/sitop-select)



For the Sitop PSE200U, application examples are available free of charge for Simatic S7-300/400/1200/1500 as well as for Simotion CPUs

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## Sitop Selection Tool

# Quickly and easily select uninterruptible power supplies

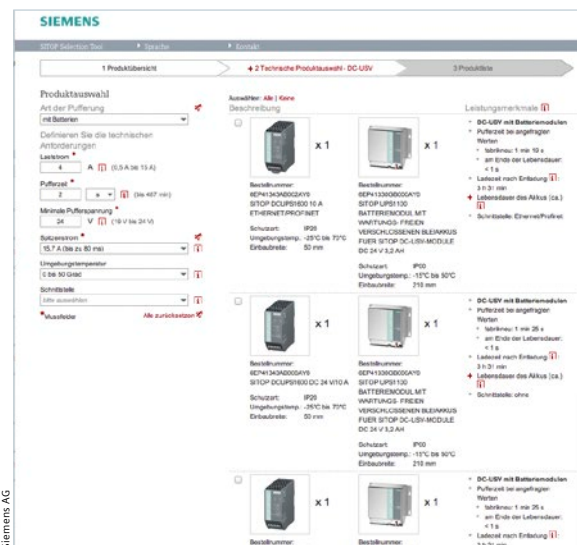
The new version of the Sitop Selection Tool enables the rapid selection and ordering of new Sitop UPS1600 uninterruptible power supplies with battery modules in addition to the existing product portfolio of power supplies as well as capacitor-based and battery-based DC UPS. Here is how it works: After the user enters a few parameters, the applicable capacitor or battery systems are displayed together with their performance characteristics.

As additional support for the selection, several configurations can be compared based on their performance characteristics. The relevant DC UPS configuration can then be transferred

to the product list. It is also possible to select several configurations. The DC UPS configurations included in the product list can be exported together with their performance characteristics in various file formats or be transferred to the Industry Mall shopping cart. It is also possible to directly call up additional product information such as 3-D data, schematic macros, operating instructions, or certificates for the selected products. The Sitop Selection Tool is available online and in the Industry Mall in eight languages.

[siemens.com/sitop-selection-tool](http://siemens.com/sitop-selection-tool)

Select the right DC UPS by means of relevant parameters



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## Compliance and business

### Positive Experiences

The basic rules for responsible entrepreneurship are integrity and compliance with all applicable laws and regulations. This is also true for sustainable economic activity, since it creates new business opportunities that ensure profitable long-term growth. The consequences of improper and unlawful behavior can be enormous: horrendous penalties, loss of orders, penal consequences, and not least, the resulting damage to the company's reputation. This definitely must be avoided. However, one thing is important to remember above all, namely, that a clear commitment to fair competition results in a consistent focus on product innovation and the customer.

Siemens came to know of many possible consequences in the corruption scandal in 2006. Today, Siemens is one of the models in re-

gard to compliance after successfully resolving the issue. In 2013, Siemens was rewarded once again by the Dow Jones Sustainability Index (DJSI) in seven industry sectors as the most sustainable company worldwide. Klaus Moosmayer, chief compliance officer, was elected as chairman of the Business and Industry Advisory Committee to the OECD (BIAC) in 2013. Also, Siemens meets regularly with the biggest German DAX-listed companies in order to deepen the experiences around compliance. This year the Compliance Office of the Industry Division once again presents these positive experiences with this program to its customers and business partners at Hannover Messe. Visit us; we look forward to meeting you there.

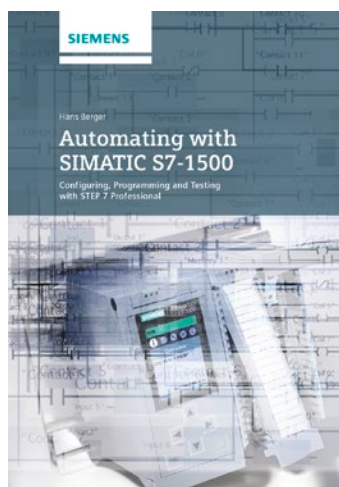
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## Siemens Partner Program

To perfectly tailor the company's products, services, and solutions to the requirements of its customers, Siemens works closely with specialized external partners worldwide. The Siemens partner program distinguishes between Solution Partners and Approved Partners. With more than 1,300 partners, the Solution Partner program is already well established worldwide. These partners primarily implement tailored and future-proof automation solutions. The collaboration program for Approved Partners, in contrast, is still being gradually setup and expanded. In addition to products, applications, and modifications, they also offer a broad range of services to their customers.

An inherent part of the partner program is the systematic further development and qualification of partners in accordance with contractually defined quality criteria as well as clearly defined processes for optimum support.

This ensures that the partners excel in the required qualities:

- Solid product and system know-how
- Very good service performance (field service, repair, retrofit)
- Technical competence and high quality of advice
- High delivery capacity and reliability
- Excellent industry knowledge
- Exceptional solution expertise

The Partner Finder quickly and reliably locates the ideal partner for all tasks:

[siemens.com/automation/partnerfinder](http://siemens.com/automation/partnerfinder)

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The image features a Siemens SIMOCODE pro S hardware unit in the background, with a laptop in the foreground displaying the SIMOCODE ES software interface. The software shows a hardware catalog with various modules like SIMOCODE pro C, pro S, and pro V, as well as current detection and measuring modules. The hardware unit has a red 'TEST/RESET' button and a 'READY' indicator. The Siemens logo is prominently displayed in the top left corner.

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