

# advance

The magazine for Totally Integrated Automation

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## Shaping the future of manufacturing

Digitalization in the manufacturing  
industry increases efficiency and  
flexibility





## Editorial

### 04 Inform with relevance

## Focus

- 06 Shaping the future of manufacturing**  
Interview with Anton S. Huber about  
Digital Factory in the manufacturing industry

## IT Security

- 10 Three steps to security**  
Integrated security solutions with  
Managed Security Services (MSS)

## Safety technology

- 12 Tailor-made safety guards**  
Hans Georg Brühl GmbH uses Sirius  
safety switches for tailor-made solutions
- 14 Huge wooden parts – safe and secure!**  
Drive technology with integrated security proved  
itself at the woodworking company Balteschwiler

### 16 Safer ground drilling

Fail-safe distributed I/O systems guarantee high  
explosion protection at Herrenknecht Vertical

## Totally Integrated Automation

- 19 Precise pail filling**  
Simatic S7-1500 guarantees maximum control  
accuracy in filling station of Feige Filling
- 20 Standard ensures quality and cost-effectiveness**  
Increased process reliability with Simatic S7-1500  
in gear-hardening shop of Siemens AG
- 22 Don't invest – optimize!**  
Newest control technology reduces energy costs  
at Quintec
- 24 Clear advantage for brick production**  
Innovative operating and monitoring system in  
Keller HCW's Polish brick production facility

## Integrated Drive Systems

- 26 Up-to-date cement mills**  
Retrofitting pilot project at HeidelbergCement

## Shaping the future of manufacturing



- 28 Integrated service for perfect drives**  
Interview about Drive Train Condition Monitoring
- 30 Strong momentum for steel giants**  
Maurer German Wheels sets standards regarding energy efficiency with the world's largest Ferris wheel

### Industrial communication

- 33 Hands-on Profinet training**  
Basic and advanced Sitrain courses for a wide range of users

### Industrial remote communication

- 34 Flexibility with a system**  
New products for telecontrol technology based on Simatic S7

### Condition monitoring

- 36 Efficiency in the press shop**  
Siplus CMS saves time and energy at Volkswagen AG

### Industrial identification

- 38 Identify objects quickly and reliably**  
Gap-free traceability of products with Simatic MV440

### Power supply

- 40 Selective monitoring and diagnosing**  
Sitop PSE200U reliably monitors 24-V load circuits

### Industrial controls

- 42 Foilmachines geared up flexibly**  
Bandera modernizes its production with compact Sirius 3RM1 motor starters

### Partner program

- 44 Experts in demand**  
Siemens' Partner Program supports with solutions in automation and service

### News

- 45 Energy-saving door assembly with Profienergy / The Sinamics Perfect Harmony product line expands**
- 46 Sitop UPS1600 starter package / Multimedia magazines**

### Dialogue

- 47 Library / Newsletters**





Siemens AG

## Inform with relevance

It has been almost 15 years since the first edition of *advance* began offering information about solutions, trends, and innovations in automation technology. The magazine's focus continues to be on the manufacturing industry and how Totally Integrated Automation (TIA) represents the efficient interaction of all automation components. Especially in the recent past, we were able to show time after time, how efficient engineering is gaining more and more importance and how software has become an essential condition for digitalization in manufacturing. Digital Factory, Siemens' newest division as of October 2014, will therefore focus on solutions for the ever-increasing demands of the manufacturing industry. You can find out more information about Siemens' new organization from the interview with Anton S. Huber, head of Digital Factory.

A great deal of positive feedback has confirmed that our readers appreciate *advance* magazine. In these times of highly dynamic development in digital media, information-seeking behavior has changed quite a bit, and current studies prove that electronic media are on the rise for corporate decision makers. We have responded to these changes by offering *advance online* at [siemens.com/advance](http://siemens.com/advance) and the tablet version of *advance*, which you can download at [siemens.com/publications-app](http://siemens.com/publications-app), in addition to our printed edition.

Whether you read *advance online* or the app magazine, you will get much more than what is offered in the print edition. In addition to offering up-to-date production information and company news, our electronic media are cross-linked with the TIA newsletter, the Siemens Industry blog, our YouTube channel, and our Twitter. QR codes in the printed edition allow for quick access to relevant information on the Internet. The gold award for this cross-media mix from the renowned Best of Corporate Publishing (BCP) 2014 competition, organized by Europe's most important corporate publishing association – Forum Corporate Publishing – proves that we are definitely on the right track.

We hope that you benefit – in whatever form – from the practical and relevant information in *advance*.

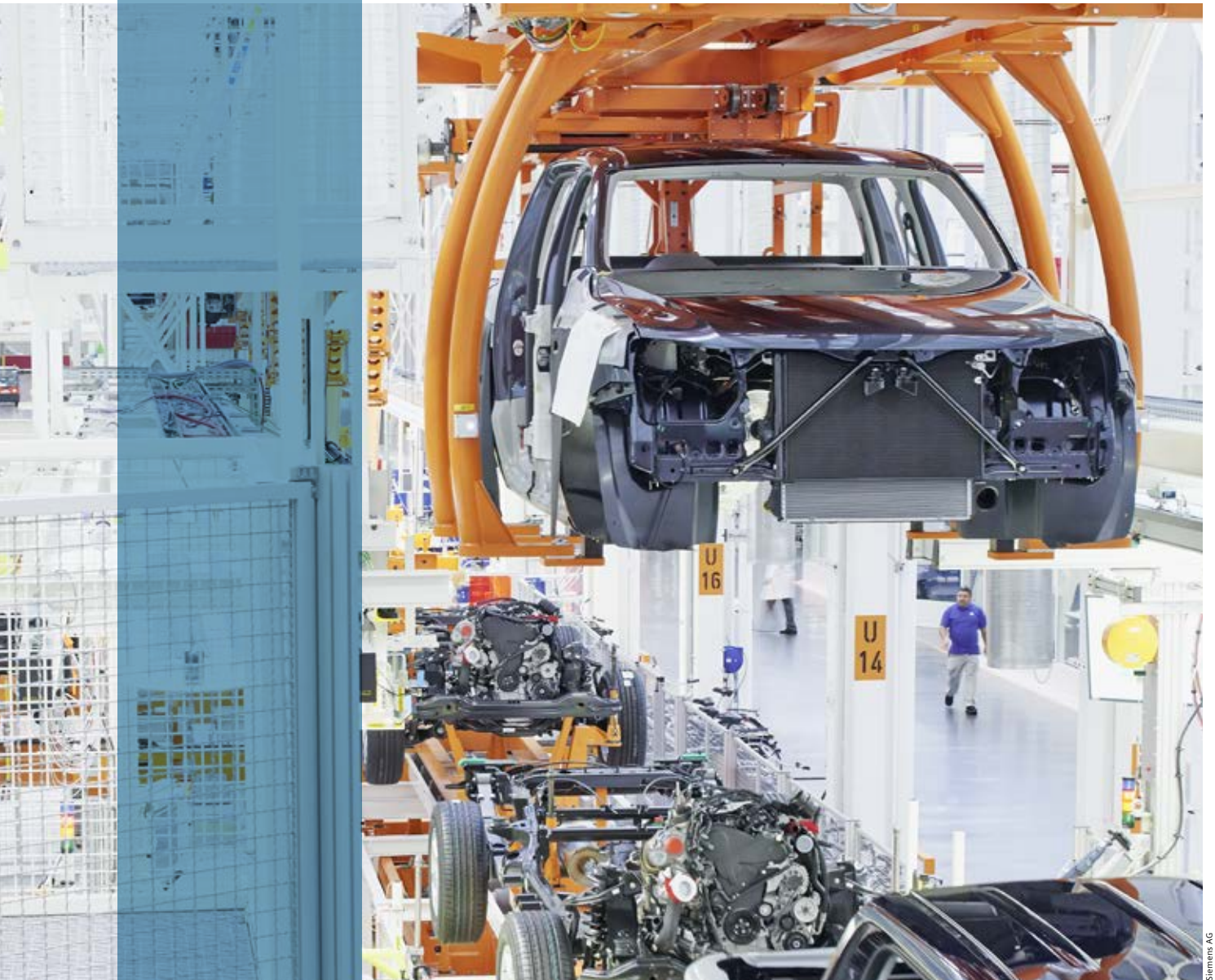
Yours,

A handwritten signature in blue ink that reads "Ralf Schmitt". The signature is stylized with a large, looped 'R' and a cursive 'Schmitt'.

**Ralf Schmitt**

Head of Communication Industry Automation





Siemens AG

**Interview with Anton S. Huber**

# Shaping the future of manufacturing

With the restructuring of Siemens, the Industry sector has been divided into the Digital Factory Division and the Process Industries and Drives Division. We spoke with Anton S. Huber, who will be head of the Digital Factory Division as of October 2014, about the division's strategic goals and challenges.

Mr. Huber, as of October the company's activities for the manufacturing industry and for the process industry will be concentrated in two divisions. What induced Siemens to make this change?

**Anton S. Huber:** The most important reason is that we will be able to respond even better to our customers with the new structure. Product and production lifecycles and automation-relevant customer needs in the manufacturing industry differ from those in the process industry. The manufacturing industry is distinguished by high quantities of mainly individual products that need to be produced as fast and efficiently as possible. In the process industry, however, the focus is often on mastering complex process chains for the production of liquid, gaseous, or solid substances in expensive production plants that need to be used for as long as possible. With the restructuring, we are striving to align our offerings even better for our customers in the different industries.

Can you give us an example that highlights the differences between the industries?

**Huber:** Sure. In the manufacturing industry, the software for product development and production planning has assumed a key role. New products – from reflex cameras to cruise ships to the Mars rover Curiosity – are nowadays first developed as digital mockups that contain all the components such as mechanics, electrical systems, electronics, and software. That way, the product can be simulated and optimized without needing to construct a physical prototype. Comprehensive software – such as TIA Portal – is used for the planning and engineering of automation, ideally simultaneously to product development. The advantage is a considerably shorter time to market for new products. The precondition is complete and continuous support with software tools along the value chain. This is the only way to quickly verify product changes by means of simulation, which can then be forwarded to production, and, conversely, experience from ongoing production influences product development.

In addition, industrial software such as our product Comos is used in the process industry for the planning and operation of facilities. Unlike in the manufacturing industry, no robots or machine tools need to be controlled here, but ducts with valves or mixers must be controlled accurately and continuously, for example, to retain with thermal processes. The product offering for the two industries therefore varies greatly according to the different needs and demands.

So software and digitalization are the focus of the modern manufacturing industry?

**Huber:** Yes, the digital factory is no longer a fantasy but is gradually being refined more and more. Virtual worlds keep merging with real production and create competitive advantages for our customers. The

point of the Digital Factory Division for us is to provide our customers in the manufacturing industry with the tools they need to be even more successful. With our Digital Factory offerings we can help increase our customers' production efficiency and thus enable them to bring their products to market more quickly while increasing their productivity and flexibility at the same time.

What must be done if you want to turn an existing factory into a digital factory?

**Huber:** There are several factors, of course, which vary from industry to industry. It is very important to me that we don't forget about the installed base and do everything to help our customers find their own individual way into the future of their industry. That requires investments on our side, for the further development of products, and time and effort on the customer's side, for the development of an adequate solution together with us. There won't be a one-size-fits-all solution. The benefits – digital plant engineering, for instance – become noticeable, however, in the long term. New or changed production processes can be simulated and implemented much easier and faster. In addition, recurring process steps can be standardized, digitally stored, and quickly and easily integrated into new sequences. Another example is virtual commissioning in combination with consistent automation such as Totally Integrated Automation (TIA), enabling the transfer of digital data after simulation and optimization into real production. That makes it possible to achieve considerably faster production changes with a consistently high quality at the same time.

When is the right moment to invest in the digital factory?

**Huber:** Now! The right moment has come to set the course for the future. Anyone who is still waiting for tomorrow's offer before jumping on the train has already lost. In the end, we are not just talking about a new graphical program here or an RFID solution there but about the integration of all the steps along the value chain. The adjustment of products, process steps, and sometimes even the organization takes time. With our products, solutions, and many years of experience we are on our customers' side.

The future of industry is also referred to as Industrie 4.0 from time to time. What exactly is this?

**Huber:** The heart of the vision of Industrie 4.0 is the "Internet of things," which is an omnipresent network of persons, things, and machines. This network is expected to generate a variety of new services and supplies. Products, means of transport, and tools are intended to negotiate, in a virtual marketplace, which elements of production could do the next step of production best. Thus, the virtual world would seamlessly link with real-world objects. It remains ►►

to be seen, from case to case, where the great additional benefits due to this vision really are and which consequences will follow. Today, there are already enormously optimized production processes that are exclusively carried out in a predefined sequence. Such technologies will continue to be enhanced in the future and will slow the introduction of innovations. My goal is to make our customers more com-



Erich Maltzer

“The automotive industry is a pioneer in the development of the digital factory, as manufacturers operating on an international level need to maximize the efficiency of their processes in view of increasing cost pressures.”

Anton S. Huber

petitive and to support them to the best of our ability as they develop further. The consistent digitalization of the value chain is a precondition for the future of industry.

#### How is Siemens prepared for this future of industry?

**Huber:** Siemens has been expanding its activities relating to vertical IT and industrial software for years and laid the foundation for the future of industry long ago. With TIA, Integrated Drive Systems (IDS), product lifecycle management (PLM) software, and Data-Driven Services, we are pioneers in the field of continuous and integrated production development and production technologies. This allows us to optimize the entire value-chain process of our customers – from the idea for a new product to production to service. Efficient engineering plays an important role here, as, with the increasing complexity of automation, the demands on the hardware are rising



like the complexity of the control software and therefore the engineering costs. With our TIA Portal, we are meeting this challenge.

#### Are there concrete examples of the digital factory already?

**Huber:** Yes, there are already examples of factories where production processes are continuously digitally supported, but these processes are currently not very complex. As soon as development and commercial divisions are digitally integrated in addition to the shopfloor, meaning that the value chain is consistently digitalized, we can refer to a digital enterprise. There is progress here as well, which we are already putting into practice in our electronics facilities in Amberg, Germany, and Chengdu, China. About 1,000 different products are produced in Amberg. To be able to produce these products in a flexible and efficient way, state-of-the-art software tools such as the PLM program NX and Teamcenter are used in the product development process as well as a variety of Simatic controllers and the Simatic IT manufacturing execution system (MES) software in the production process. Our products merge seamlessly and are linked to the enterprise resource planning (ERP) systems via interfaces. Over the last 20 years, we have been able to improve quality while maintaining an almost constant number of employees and to reduce the number of errors from 550 to 12 – in about 1 million process steps – and to multiply the production volume at the same time.

#### In which industries do you see the greatest potential for a digital factory?

**Huber:** The automotive industry is certainly a pioneer in development, as manufacturers operating on an international level need to maximize the efficiency of their processes with increasing cost pressures in mind – not only in production but also in development. The fierce competition in the automotive market forces manufacturers to bring new models to market faster and faster and to provide a variety of equipment versions. To be able to perfectly fulfill the customers' demands, the right component must be ready for use at the right time in the right place for the right car body – a logistical challenge.

We offer the industry a standards-based (largely geared to open standards), easy-to-engineer, and consistent hardware and software portfolio that considerably increases the efficiency of production processes and reduces costs over the entire product and production lifecycle. Our product portfolio provides a comprehensive solution for our customers that are in cost competition or fighting for markets. With our products, we are already creating strong linkages between the virtual and real worlds in production.

#### What about the security of IT products in the digital factory?

**Huber:** Industrial security is a very important consideration. The ever-increasing integration and digitalization of production requires advanced security systems. We offer consulting services and the development of such systems, but we are also integrating security functions into our products as standard. The security functions of our new S7-1200 and S7-1500 controller generation can be used efficiently in combination with TIA Portal. To further increase security, we are collaborating with McAfee as a strategic partner to establish next-generation firewalls, security technologies for end devices, and global risk detection for industry over the long term. You cannot just buy security like any other product – security systems and functions must be implemented consistently.

#### Does integrated production also influence other Siemens offerings, such as the service area, for instance?

**Huber:** Yes, of course. And as a result, we have significantly expanded our service offerings during the past years. With Data-Driven Services we are perfectly prepared for the digital factory, where innovative software is the most important factor. When process and production data are continuously captured and analyzed in real time, the availability and performance of plants can be increased along with the quality of products. In addition, energy efficiency can be considerably increased as well.

**Mr. Huber, thank you very much for this interview.**

**Anton S. Huber**, born in Mühldorf am Inn, Germany, in 1951, started his career at Siemens AG in 1979. After working in various positions in the field of components and automotive engineering in Germany and the United States and taking on leadership roles in the field of automotive engineering, he was named head of the Industry Automation Division in 2008. Huber will be head of the newly created Digital Factory Division as of October 1.

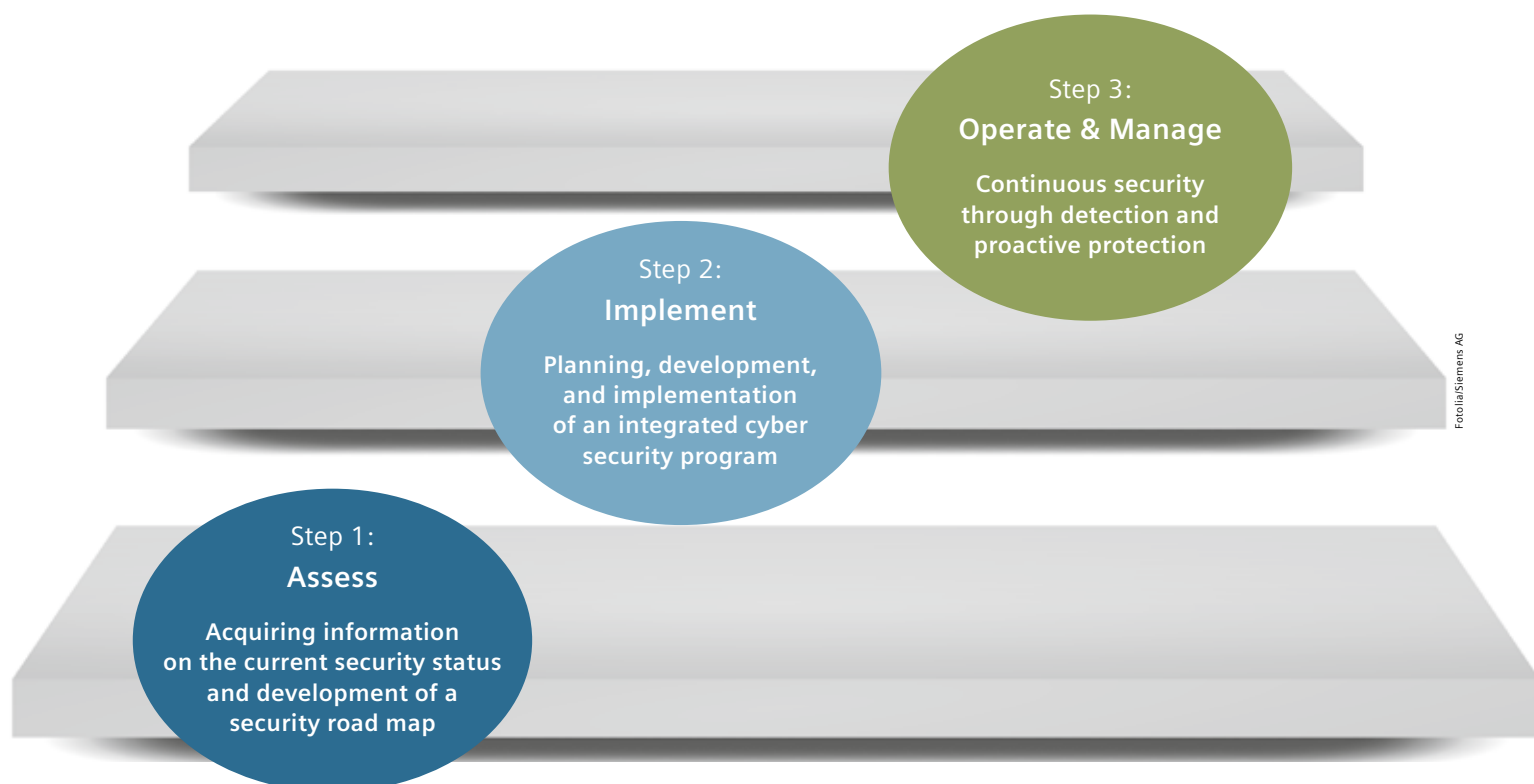
**Managed Security Services (MSS)**

# Three steps to security

Industrial enterprises are facing a growing number of cyber threats. Industrial security technology requirements are especially increasing due to the growing digital integration and the accompanying increased networking. For this reason, enterprises need integrated security solutions that take into account the specific requirements of production environments.

**T**he horizontal and vertical networking of industrial plants is increasing significantly in the move toward digital integration. The advantages of digital integration are obvious: direct exchange of data and information and no duplicate data recording. However, this increased networking and digitalization in industrial plants also results in new chal-

lenges with regard to IT security. These challenges include, for example, the longer operating life of the installations that need to be protected. While life-cycles of two to four years are standard in an office environment, industrial plants usually have a service life of 20 years and more. To implement and operate a security solution for an industrial plant, different



and further-reaching approaches are required, including a defense-in-depth strategy that adjusts to changing threats. This requires expertise in both automation and IT security technology.

### Assessing cyber risks in time

With its Managed Security Services (MSS), Siemens supports industrial customers in setting up and operating a comprehensive security program throughout the entire lifecycle of their machines and plants. MSS offers a formal three-step approach to addressing these specific aspects of industrial security. It starts with an evaluation of the risks and weak points of the plant. This analysis of the current situation addresses technology, people, and processes. With the inclusion of the installed technology (software and hardware), the training level of the personnel, and the already introduced and practiced processes and guidelines, this analysis forms the basis for the next steps. After the assessment of the current situation, a threat model is prepared, from which the risk level is derived. In the end, the customer receives a risk assessment of the plant including a road map showing measures that can reduce security risks to an acceptable level.

### Planning, developing, and implementing security measures

The next step of MSS is the implementation of the measures identified in the road map. This begins with setting up a defense-in-depth program in accordance with IEC 62443, which also includes the three areas of technology, people, and processes. To protect industrial networks from external attacks, security cells are created that are protected by firewalls. These control the data traffic flowing into and out of the cell. The firewalls are next-generation firewalls (NGFWs), which have rules and filters to analyze data traffic for unwanted content. Classic firewalls often are unable to understand industry-specific communication protocols. In this context, Siemens is cooperating with McAfee, a division of Intel Security. Through security measures such as NGFW, intrusion detection and prevention services, and other technologies for terminal equipment, the solutions meet all the requirements of automation systems.

In addition to protecting the cells from external threats, data traffic within the cell should also be

monitored and controlled. Among other things, intrusion detection and prevention services serve this purpose and examine all the activities within a network segment of the automation system. Another measure is the protection of terminal equipment in the industrial plant, for example, with whitelisting or antivirus software or through hardening. This process also switches off all services and ports that are not needed, reducing the systems' vulnerability to attacks.

### Continuous monitoring

The final element of MSS is the continuous monitoring of the industrial plant and of the implemented components. In this process, the plant is linked with a Cyber Security Operation Center (CSOC) via secure channels and is thus able to transmit security-relevant data. A system called Security Information and Event Management (SIEM), combining warning messages from network hardware components (firewalls, routers, switches, etc.) and automation devices, is used here. In the context of continuous monitoring, all warning messages from the network infrastructure as well as from SCADA and DCS devices are collected. The information gained in this way enables an immediate and targeted response in case of a security incident.

Because the threat landscape is constantly changing and new threats are continuously emerging, constant observation is a crucial precondition for the success of an industrial security program. For this it is necessary to collect and analyze relevant information (e.g., on current malicious code) and pass it on. Only then can companies make sound decisions regarding security. Previously, such global threat intelligence was available only on a limited basis for industrial control systems. Through the cooperation with McAfee, Siemens is now offering companies a solution that allows them to receive information on current threats early, thus enabling them to act proactively. ■

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Hans Georg Brühl GmbH, Germany

# Tailor-made safety guards

Safety measures for machinery, equipment, and people implemented in the past with the help of complete enclosures can hardly be compared with today's safety guards. From a yellow fence with an access door, the safety guard has since developed into an essential component of sophisticated safety concepts in which the safety switch program plays a particularly important role.

**W**hat do industries such as sheet metal forming, the food industry, and bearing technology, or production facilities such as welding plants, laser centers, and robot applications have in common? Hans Georg Brühl GmbH, headquartered in Netphen near Siegen, Germany, provides the answer to that with its innovative safety guards. All the above-mentioned industrial sectors and many others need applications that reliably protect both people and equipment from harm in any situation. Brühl GmbH develops and builds such applications and tailors them to the client's needs.

## High sensor flexibility

A key characteristic, in addition to solid metal construction, is high flexibility in the sensor monitoring of doors, flaps, bars, and tumblers. Although each safety solution is individually adjusted, Brühl is trying to incorporate the highest possible degree of standardization. Heinrich Brühl who manages the company together with his brother Hans Georg Brühl explains: "The greatest additional benefit is provided to our users

and to us by a comprehensive range of sensors that are perfectly synchronized and can thus be flexibly used if plants have to be adjusted." The Sirius 3SE5 position switches for standard applications and for fail-safe monitoring form such a range, and practitioners have already gained very good experience with them. The fail-safe position switch from the 3SE5 series has a separated actuator and an electromagnetic guard control. The flexibly supported actuator locks smoothly even in the case of large door systems. A single position switch is therefore sufficient for use in escape, swing, and sliding doors. It is also robust, wiring is simple, and it is applicable to all safety switches in the Sirius series. Another advantage, which is important to the experts from Siegerland, is the fact that the actuator locks from five directions. The fifth run-in direction from the front end makes the construction of sliding doors, for example, much easier. In addition to different actuators, the 3SE5 is also available with a large number of unlock mechanisms, which is also very appreciated at Brühl. "The determining aspect is that – with the Siemens portfolio – we are able to

offer the right solution for virtually any application," says Heinrich Brühl.

## Suitable solution for lifting gates

One of the specialties of the safety guard manufacturer from Netphen is lift gates, which need to be equipped with suitable switches. The Sirius 3SE6 electronic safety switch with a noncontact, fail-safe RFID sensor has a tolera-





A specialty of the safety guard manufacturer Brühl is lift gates that are equipped with individual safety solutions



The Sirius 3SE5 position switches can be used very flexibly. For instance, the actuator heads can be turned by 4 x 90°

ble lateral offset of 18 mm and a switching distance of 10 mm and is ideal for this type of application. Due to the sensor's intrinsic safety, protection class SIL 3 according to IEC 61508/62061 or PL e according to ISO 13849-1 can be achieved.

Depending on the user's requirements, Brühl lifting gates are also equipped with a safety analysis function. The new 3SK1 safety relays with

detachable spring-loaded terminals are used for the new lifting gates. The advantage of these spring-loaded terminals is a solid, vibration-proof connection that eliminates the need for any adjustments during the service life of the machine. The safety switching devices are certified up to SIL 3 according to EN 62061 or PL e according to ISO 13849-1. Depending on the version, 3SK1 basic modules can be complemented by sensors or outputs with the help of device connectors. The advantage: wiring is considerably reduced, as, in addition to the power supply, there is also no need to connect any sensor or output cards.

In the case of the lifting gates, Brühl also monitors load-bearing units with regard to fall protection. Thanks to a 3SE5 metal position switch with roller lever, the door control recognizes if the load-bearing unit is strained. The same applies here as with all safety devices in production facilities: they must withstand a harsh working environment. It does not matter whether certain safety devices are completely equipped with fail-safe switches or whether certain subfunctions are covered with standard

switches. That way, a fail-safe connection can be assembled with, for instance, two standard switches that are monitoring each other.

### The right solution for every requirement

Due to its 30 years of experience, Hans Georg Brühl GmbH knows that the market for safety concepts is gradually changing. Given the large variety of switches available today, most add-on adapters need to be customized. "Our competitive advantage is that our range of products and services is much more comprehensive than that of many other manufacturers. And we need the right partners and the right solutions for that," emphasizes Heinrich Brühl. "Therefore, large switch series such as Siemens provides with Sirius 3SE5 are a great advantage." ■

**"We need a comprehensive range of switches such as Siemens offers to be able to construct customized safety guards intelligently and economically."**

Heinrich Brühl,  
Managing Director, Brühl GmbH

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Balteschwiler AG

The Balteschwiler cutting and machining center is the largest of its kind in Switzerland

Balteschwiler AG, Switzerland

# Huge wooden parts – safe and secure!

At the new cutting and machining center for large-format wooden parts, the Balteschwiler company automatically cuts, mills, drills, chamfers, and grinds complex wooden panels and construction elements of up to 13.5 m in length, 3.5 m in width, and 250 mm in thickness. The operations rely on state-of-the-art CNC and drive technology with integrated safety.

**W**ith its largest and most efficient cutting and machining center for wooden parts in Laufenburg, Switzerland, Balteschwiler AG opens up new opportunities not only for joiners' and carpenters' workshops and wood construction companies but also for steel construction companies active in industrial building construction and bridge construction. The technological heart of the fully automated production unit is a Vision III-TTT Sprint CNC machining center from Reichenbacher Hamuel GmbH, located in Dörfles-Esbach, a town near Coburg in the Upper Franconian region of Bavaria, Germany. With

travel paths of 14.2 m x 4.2 m x 0.78 m (X, Y, Z), it is one of the largest machining centers built by the company. A variety of saw blades from three pickup tool changers can be used to precisely cut workpieces that are up to 250 mm thick. The swiveling five-axis head that is moved in all directions (X, Y, Z) by the gantry performs further machining processes such as milling, chamfering, and grinding. A multiple-drill gearbox with 15 vertical and four horizontal spindles, the latter with double mounts, has been integrated for drilling tasks. This large number of synchronous positioning and processing tasks requires



a highly flexible and efficient multichannel control system. All the travel movements and processes of the Vision machining center are coordinated with high dynamism and precision by the Sinumerik 840D sl premium CNC. The CNC system, scalable in terms of power and number of axes, supports the modular machine concept and enables individual yet cost-efficient designs in accordance with the user's specifications. The Sinumerik control system is also an interface for superimposed CAD/CAM systems. With direct data transfer via networks, it enables the shortest possible preparation and retrofitting times.

### Safety included

With integrated safety functions (Sinumerik Safety Integrated), the CNC control system features straightforward, maximum protection for man, machine, and workpiece without compromising operability. This enabled the machine manufacturer to implement its time-tested safety concept for the enclosed sheet-steel gantry with the typical red safety terminal strip in bumper design in this case as well. Upon contact, it shuts the machine off within the required reaction time. Integrated safety functions such as Safely Limited Speed (SLS) make it possible to easily and flexibly implement and monitor safe, limited speeds during set-up. Sinumerik's safety functions comply with all the requirements of DIN EN 61508 for operation, including SIL 2 (Safety Integrity Level) and category 3 as well as PL d (Performance Level) in accordance with DIN EN ISO 13849. This makes it possible to easily and economically comply with all the essential requirements for functional safety via Profinet or Profibus and the Profisafe profile, without additional hardware and wiring effort.

### Economical and energy-efficient drive technologies

To reduce cabling costs and installation time when commissioning a plant with more than 20 individual drives, the machine manufacturer also always relies on Siemens drive technology. Simotics S-1FK and S-1FT servomotors that cover the entire efficiency range are found at every critical point. As with the signals from the absolute encoders of the axes, the electronic nameplates of the motors are automatically read out by the control system via the digital system bus (Drive-Clq), which eliminates the need for time-consuming and error-prone manual parameterization.

With regenerative converters from the Sinamics S120 series, the machine manufacturer is also well positioned when it comes to energy efficiency. "The Sinamics converters feed energy back into the grid sinusoidally every time the brakes are used, reaching a power efficiency of almost one. Our machines are therefore very low-loss and clean," explains Hans-Joachim Kahl, chief marketing officer at



Reichenbacher Hamuel's pin table ensures that all workpieces are securely held in place even at Sinumerik's high processing speeds of up to 60 m/min.

Reichenbacher. However, the energy balance can also be improved by shutting off parts of the plant that are not essential for its operation. This is accomplished with the Profienergy functionality, which automatically and selectively removes unnecessary components from the network from a central point, for example, during breaks.

### Repair service contract ensures availability

There are many reasons why Reichenbacher Hamuel prefers integrated automation technology from Siemens. One of these reasons is the worldwide presence of the company, which also entails readily available spare parts and support. The machine manufacturer also goes one step further and concludes a repair service contract with Siemens for all machines in order to be able to ensure guaranteed response times and minimal downtimes for users – in other words, highest availability. ■

#### INFO AND CONTACT

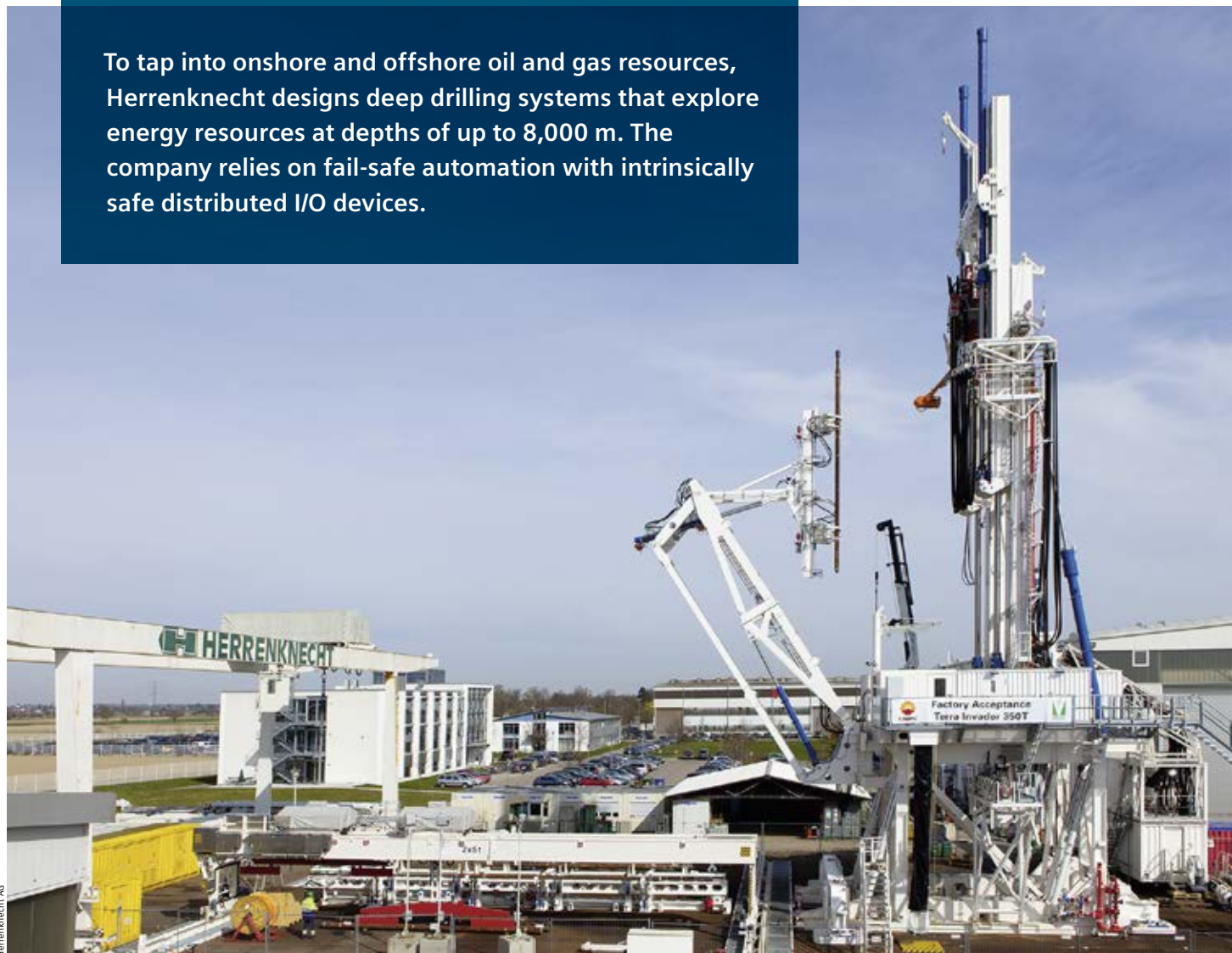
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Herrenknecht Vertical GmbH, Germany

# Safer ground drilling

With Herrenknecht drilling rigs, it is possible to drill safely and efficiently at depths of up to 8,000 m

To tap into onshore and offshore oil and gas resources, Herrenknecht designs deep drilling systems that explore energy resources at depths of up to 8,000 m. The company relies on fail-safe automation with intrinsically safe distributed I/O devices.



The method of using rotating pipes for vertical ground drilling was invented in America and triggered the first Texas oil boom in the early 20th century. In those days, it was possible to drill down only to a few hundred meters. Today, drilling rigs can tap into oil and gas reserves that are kilometers below the Earth's surface. The most innovative ground drilling systems come from Schwangau, in Baden-Württemberg, Germany. Herrenknecht Vertical GmbH, the subsidiary of the world leader in mechanized tunneling technology, Herrenknecht AG, is located there and is a market leader due to the high degree of automation offered. Automation increases the safety of man, machine, and the environment while at the same time requiring substantially fewer personnel. Safe and efficient drilling at depths of up to 8,000 m is thus possible.

### Well-engineered machines

The drilling rigs function with the top-drive method that also makes it possible to drill complicated bore-hole paths. The main component is the top drive, powered by various motors, which is on an elevated platform with a driller's cabin, the so-called rig floor. The top drive turns the drill string with the drill bit, and it also hoists drill pipes that are to be connected afterward and bolts them together in order to elongate the drill string and drill even deeper. Once the drill hole has been completed, or if the drill bit needs to be replaced, the drill string is hoisted up again and the pipes are disassembled to be reused later.

### Unavoidable risks under control

To make efficient use of the top drive, it makes sense to connect pipes that are as long as possible. The Terra Invader 350, recently delivered to China, connects two 9-m-long individual pipes to make one 18-m-long double pipe (upright). A handler hoists it from the catwalk, a rail-shaped buffer, and directs it toward the top drive. The pipes are relatively flexible. That is important, as this makes it possible to bore curved drill holes to reach reserves in inaccessible terrain. Handling these huge loads represents a serious safety risk. This is why safety sensors monitor ►►



“With the great number of safety sensors and the sophisticated emergency shutdown circuits, flexibility is a must. To continuously optimize our safety standards, Simatic S7-300F is our first choice.”

Daniel Deibel, Software Configuration Engineer,  
Herrenknecht Vertical GmbH



position, direction, and wind-induced oscillatory behavior. Multiple emergency shutdown circuits ensure that the pipes do not collide with the ground or the rig and that the handler only opens above the catwalk.

### Easily optimize safety standards

The safety-related signals are processed by the fail-safe Simatic S7-300F controller. "Integrating safety technology into the control system has many advantages," explains Jürgen Binder, technical manager at Herrenknecht. "Not only is it necessary to monitor the handler, but there are also various axes on the rig floor that are integrated into the emergency shutdown circuits." Software configuration engineer Daniel Deibel adds: "With the great number of safety

### Intrinsically safe distributed I/O systems – the extra benefit for greater explosion protection

The safety demands on the rig floor do not apply only to possible mechanical risks. The risk of explosion due to an unexpected natural gas leak also poses a great threat to man, machine, and the environment. Gas sensors and horns that warn personnel in time are obligatory when drilling deeper than 100 m. The fail-safe control system sets the plant to a predefined state and automatically activates the appropriate safety devices.

A further special feature of the Terra Invader 350: sensors and actuators are connected to the S7-300F via the Simatic ET 200iSP distributed I/O system. This is a decisive step toward increased safety. The modules, which are mainly intended for the processing industry, offer reliable explosion protection for gas and dust zones, that is, in Zones 1 and 2 as well as 21 and 22. The ET 200iSP is made up of intrinsically safe or pressure-proof encapsulated modules. The AC power supply with a voltage range of between 85 V and 264 V enables a clear reduction of power line cross sections and makes it possible to forgo a 24-V transformer. Intrinsically safe distributed I/O systems are housed on the rig floor both in a control cabinet in the driller's cabin as well as in the exterior area. Data exchange with Profibus is also made intrinsically safe with an intermediate fieldbus isolating transformer. This limits the ignition power to a safe minimum. Integration into redundant networks is also possible.

### Safe, rugged, and cost-effective solutions

Safety is the top priority for Herrenknecht Vertical. Binder summarizes: "Fail-safe automation has a key role to play here. The integrated bus communication and using distributed I/O systems even in Zone 1 on the rig floor save wiring costs. This is an important factor when it comes to overcoming the long distances from the control cabinets to the rig floor. Our customers benefit from the simple wiring every time the rig is set up. Ruggedness and easy handling are key factors for the availability of our plants, which are assembled and disassembled many times a year. In this respect, our experience with Simatic has always been very good." ■



High safety standards are needed when handling large loads. For increased safety, sensors and actuators are connected to the S7-300 via the Simatic ET 200iSP distributed I/O system

sensors and the sophisticated emergency shutdown circuits, flexibility is a must. Software solutions are superior to hardwired emergency shutdown circuits by far, as they make it possible to easily integrate more sensors or modify circuits at any time. To continuously optimize our safety standards, Simatic S7-300F is our first choice." A 319F 3PN/DP CPU is in use in the Terra Invader 350. The Simatic ET 200M distributed I/O system is connected to the control cabinet via Profinet with integrated interfaces. IWLAN access to the CPU can also be set up at the customer's request. The relatively long distance to the rig floor is overcome with a Profibus fiber-optic cable.

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Feige Filling GmbH, Germany

# Precise pail filling

When we buy a bucket of paint at the home improvement store, we just assume as a matter of course that the indicated net weight is correct. We don't really give any thought to the effort needed to comply with the relevant legal requirements. EU law allows only very small deviations even in the case of larger containers, and employees of the weights and measurements authority regularly check for compliance with allowed tolerances.

**F**eige Filling, a Haver & Boecker Group company headquartered in Bad Oldesloe near Hamburg, is the global leader in filling systems for liquids and pastes. The company has hired its own certified calibration managers and thus has the expertise to carry out conformity evaluation processes according to the European Measuring Instruments Directive.

## Maximum control accuracy with reduced cycle times

"The challenge in our industry is to balance our customers' high demands regarding cost-effectiveness, robustness, and precise control performance," says Axel Frank, who is responsible for electrical installation at Feige. For the automation of filling stations, the company has been using the Simatic S7-300 controller. At the Interpack international packaging trade fair in Düsseldorf, Feige presented a modular system with the new S7-1500 for the first time. The reasons for this choice: maximum control accuracy with reduced cycle times and

enough capacity for the coordination of up- and downstream units. Feige has already come to appreciate the advantages of TIA Portal as an easy-to-use engineering environment during the S7-300 project. The considerably higher bandwidth for data transmission via Profinet will enable efficient remote maintenance.

The new Pailfill-RWF is perfect for filling a wide variety of different liquids such as paints, lacquers, lubricants, or even ketchup. The calibratable weighing range extends from 2.5 to 40 kg. The distinctive feature: the filling unit can be purchased separately or in combination with a pail denester and/or a lid placer. In any case, the S7-1500 suffices as a central control for filling, handling, and transport.

## Continuous operation guarantees high productivity

The Simatic S7-1500 controls the axes of the handling device to fill the denester stack, the vacuum exhaustor, and the conveyor belt to the filling sta-

tion. The most demanding challenge is controlling the flow of liquid during the filling process. The machine presented at the trade fair features three filling valves. Each of the three filling stations is equipped with a weighing cell. As the filling weight of a pail nears the target value, the corresponding valve is throttled while the valve of another filling station opens by an equivalent amount; this guarantees continuous operation of the feed pump, resulting in a very high level of productivity. Another conveyor belt moves the pails to the lid placer. The finished containers – up to 40 pails per minute – can then be delivered to a palletizer.

The plant's flexibility and productivity attracted a great deal of attention among visitors at Interpack. ■

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Siemens AG, Germany

# Standard ensures quality and cost-effectiveness

During the expansion of the hardening shop at the plant for Siemens gear parts in Bocholt, Germany, an automation standard based on Simatic S7-1500 and Simatic Comfort Panels was developed that will be implemented at other existing plants. The advantage: increased process reliability and availability – with lower maintenance costs.

**F**ender drive components are the first choice where loads must be moved absolutely reliably. They are used for heavy-load cranes, ocean liners, cement mills, high-speed trains, and wind power stations. The function and quality of these high-performance drives are defined primarily by the torque-transferring gear wheels. The largest production facility for these gear components is the Siemens facility in Bocholt, which contains one of

the most important European hardening shops, with 27 shaft furnaces. Components with a diameter of up to 2 m and a maximum weight of 10 t obtain the required material properties here.

In addition to achieving the required carburization profile on the component surface, energy-efficient control of the shaft furnaces is of economic significance. The shaft furnaces in which the components are carburized for up to 120 hours generate high energy costs

and consume large quantities of media. The high mechanical and process-specific loads of the shaft furnaces also require intensive maintenance.

## Greater user-friendliness and process reliability

Three shaft furnaces, one quench bath, one tempering furnace, and one spray shower in a new assembly bay have each been equipped with a Simatic S7-1500

View of the hall in the hardening shop: an identical Simatic Comfort Panel is attached to the gas supply units for each plant in the hardening shop





controller with CPU 1511. In the case of the shaft furnaces, the S7-1500 units control the heating circuits and manage the safety functions of the gas feed to control the carbon concentration in the furnace. With regard to the quench bath, the S7-1500 unit controls the temperature of the quench medium. It controls the G120 inverter for the oil bath recirculation and activates the suppression of flames with nitrogen before components are dipped in to keep the emerging flame low.

Each part of the plant has its own control cabinet in the central control room. A Simatic TP1500 Comfort Panel visualizes and documents the current course of the process, showing the temperature profile and media consumption. An additional engineering station centralizes the user programs and interfaces of the six units of the plant and acts as a server to be accessed during remote maintenance.

Another identical Simatic Comfort Panel is attached to the gas supply units for each plant in the hardening shop. The Comfort Panels are supplemented by one Simatic Key Panel KP32 each for direct access to the control. The large illuminated buttons of the operating units are parameterized with

different colors for different conditions, and they are visible from a distance. The uniform equipment of all plant units facilitates operation and therefore increases process reliability. Peter Ludwig, who is responsible for processes in the hardening shop, and Markus Flacke, project manager for electrical engineering, agree: "Thanks to the new visualization, we are now able to recognize the complex process relations better and to monitor them more easily."

### Higher plant availability through integrated system diagnostics

Jürgen Spruch, head of central production engineering and maintenance, believes the maintenance department also benefits from the new automation technology. Important aspects here are the significantly enhanced presentation and documentation of actual and target values and the display of system-relevant notifications on the Simatic Comfort Panels. "Previously we were unable to schedule maintenance measures precisely enough. Documenting process parameters helps us exploit the service life of our high-quality devices and units much better," explains Spruch. Another example is the calibration of

the Ultramat 6 gas analyzer, which is partially automated now. "S7-1500 and TIA Portal enable us to perfectly customize all the processes to our needs and, as a result, reduce the downtimes," Lothar Schmidt, deputy head of the hardening shop, summarizes the benefits.

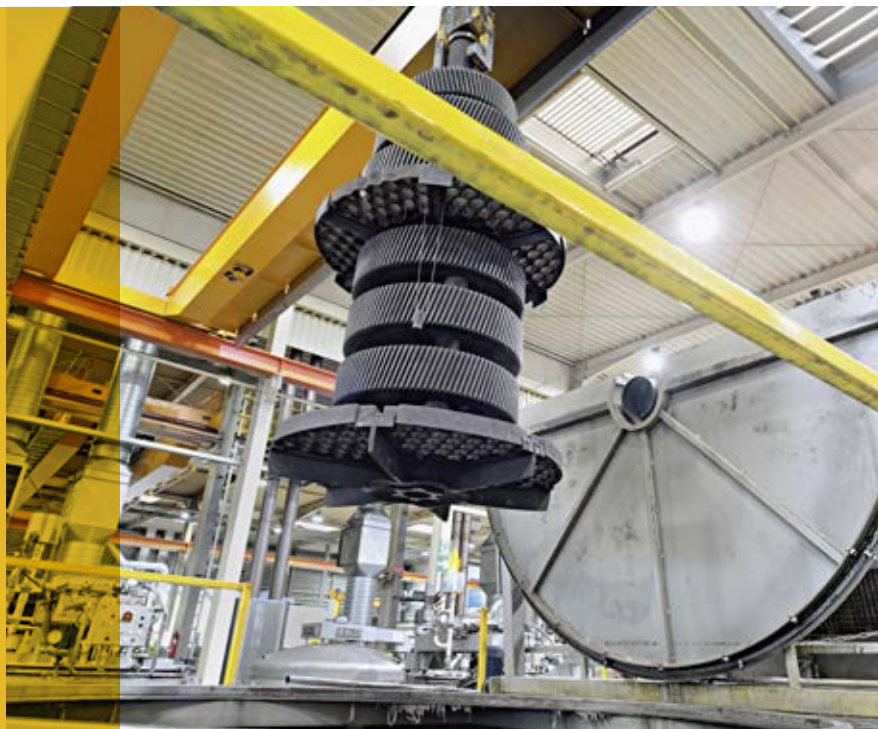
### Application in other plants

Additional synergies are expected from the application of the standard in other parts of the plant. "If we are able to reproduce the best of a complete process, it will increase the process reliability and availability of the entire plant. This is only possible when all the furnaces are equipped with a defined standard," explains Spruch. "The developed standard is currently also being implemented during the refurbishment of the hardening shop in the facility in Penig. The aim is to apply technical innovations in all our facilities worldwide. The benefits for maintenance then range from reduced costs for the stocking of spare parts and the option of plant optimization throughout facilities to the resolution of faults with the help of remote service."

### Impressive engineering efficiency

Isa engineering GmbH in Bottrop developed the software for the new plant. During this project, manager Uwe Blatz came to know the benefits of TIA Portal – and does not want to do without them anymore. "The possibility of configuring the control and visualization using one user interface convinced us. We are saving considerable costs and our customers profit from a more transparent solution. In the meantime, we are recommending TIA Portal to our customers in different sectors and have already successfully implemented additional projects with it." ■

The manufacturing plant for gear parts in Bocholt has 27 shaft furnaces for components with a diameter of up to 2 m and a maximum weight of 10 t



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Siemens AG | W. Geyer

**Quintec Automatisierungs- und Datentechnik GmbH**

# Don't invest – optimize!

Siemens Automation Solution Partner Quintec significantly reduces its customers' energy costs solely by optimizing the heating control. Furthermore, thanks to comprehensive data collection, automation with Simatic S7-1500 as an industry-compatible standard for building services control systems also reveals additional savings potential.

Is it possible to improve the indoor environment and at the same time significantly reduce heating costs without having to resort to structural redevelopment? Stefan Krüger, an energy management expert at Quintec GmbH in Pleidelsheim, Germany, knows from experience that energy costs can be reduced by 15% to 40% simply by optimizing the existing heating control. "Conventional heating control systems use external and internal temperature sensors to control the temperature and adjust the temperature only at night or over the weekends. The building's heat storage capacity, as well as usage

behavior and heat available from solar radiation, are seldom taken into account. MeteoViva Climate determines these variables as precisely as possible and makes a need-based heating control system possible," says Krüger.

## Identifying and using influencing variables

To optimize the temperature control, Quintec works together with MeteoViva GmbH. The company has developed a method with which the actual heating needs of a building can be determined, taking into account how and

when the building is used, as well as any internal loads, physical properties, and weather forecasts. This information is used at the MeteoViva research center to determine the set-point values, which are continuously adjusted using the reported measurement data and transmitted to the customer's heating control system several times a day. Should the optimization not detect any need for heating, the heating units are turned down or switched off. "The savings potential increases with the dynamism of the usage behavior and of climate influences, as well as with the increasing complexity of the technical





**“We have created a module library for heating control in TIA Portal, which we can access at any time. Using Simatic S7-1500 as a standard is interesting, because the heating control does not usually use up its entire capacity.”**

**Stefan Krüger, Energy Management Expert, Quintec GmbH**

equipment of the building,” says Krüger. Highly dynamic usage behavior is the norm in commercial properties. A large number of people regularly go into the building, use electrical devices that radiate heat, and then leave again. Changing weather conditions have an effect on buildings with large windows that radiate heat but also let the sun’s energy through into the building.

### **Simatic S7-1500 as heating control system**

Quintec can provide a number of references when it comes to energy management. When the heating control system was to be changed at a customer’s plant, Krüger used his company’s know-how as a Siemens Automation Solution Partner and chose a Simatic S7-1500 controller with 1511 CPU. The assignment came from the German publishing companies Verlag Nürnberger Presse and Olympia-Verlag, which not only publish one of Germany’s most important regional newspapers but also the well-known *kicker Sportmagazin*. Verlag Nürnberger Presse has been EMAS certified since 1998. In the context of the environmental management system, the company has set itself the environmental goal of saving about 100 MWh in district heating. One step toward achieving this goal is saving 20% in district heating in the building located at Badstraße 9-11 by using MétéoViva Climate.

Together with his colleagues from the energy-savings working group, Dieter Bubenberger, who is responsible for the publishing company’s energy management, first chose the admin-

istrative building with the in-house “press restaurant” as a pilot project for the innovative control system. To this end, Quintec delivered a completely new control cabinet that was installed in January during the heating period. MétéoViva Climate requires temperature data from the building as feedback. These data, provided by existing sensors as well as by retrofitted radio sensors, are processed by the control system and transmitted to the MétéoViva data-processing center. The initial results have shown that the ambitious goal will be achieved, and perhaps even surpassed. Bubenberger can see this positive experience being applied to the production area as well.

### **Industry-compatible standard**

With Simatic S7-1500, an industry-compatible standard for the building services control system has been found. Sensors, valves, and mixers are connected via the ET 200SP modular distributed I/O system. The integrated energy meter module gathers and records electrical indicators, such as energy consumption values. The data are visualized on a TP700 Simatic Comfort Panel. All the communication takes place with Profinet/Ethernet. This made it possible to integrate the radio sensors that measure the temperature and air quality using the existing network infrastructure. Krüger emphasizes that “more and more often, companies also want to integrate the energy management system of their production sites and administrative buildings into the energy management system of their production equipment. The efficiency of such

systems can be increased using a standard foundation.” As a Siemens Automation Solution Partner, Quintec knows what the industry requires. Krüger says: “We have created a module library for heating control in TIA Portal, which we can access at any time. Using Simatic S7-1500 as a standard is interesting, because the heating control

**quintecgmbh.com**

Quintec Automatisierungs- und Datentechnik GmbH is an experienced service provider for complex automation projects, including process engineering plants. One of the company’s business sectors focuses on optimizing existing automation systems to reduce energy consumption.

Solution  
Partner

Automation  
Drives

**SIEMENS**

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GmbH  
Pleidelsheim**

does not usually use up its entire capacity.” This is also good news for Bubenberger, from Verlag Nürnberger Presse: “The comprehensive collection of data shows further potential for optimization. This transparency is very encouraging.” ■

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**T**he Polish company Zakłady Płytek Ceramicznych Przysucha S.A., a manufacturer of ceramic products from natural materials, has produced high-quality finished goods since 1972. "For a long overdue expansion of our production facility, we have invested in a completely new production line for the manufacture of brick products," reports Marek Szymkowiak, managing director for corporate development and investments. Where about 30 to 40 t of brick per day were produced previously, the new plant has enabled the company to make another 70 t per day since the summer of 2013. An extrusion process is used to produce the ceramic brick plates. In the production line, which is more than 100 m long, a homogeneous compound of various raw materials is processed and pressed through extruder dies. These raw bricks subsequently run through a

drying and firing process before being packed and prepared for dispatch.

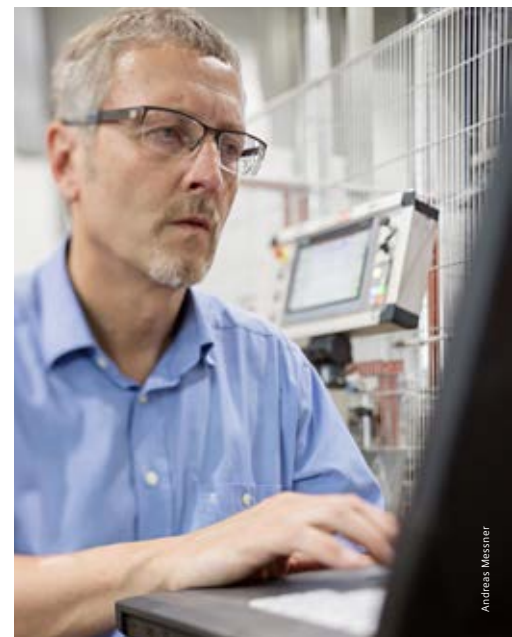
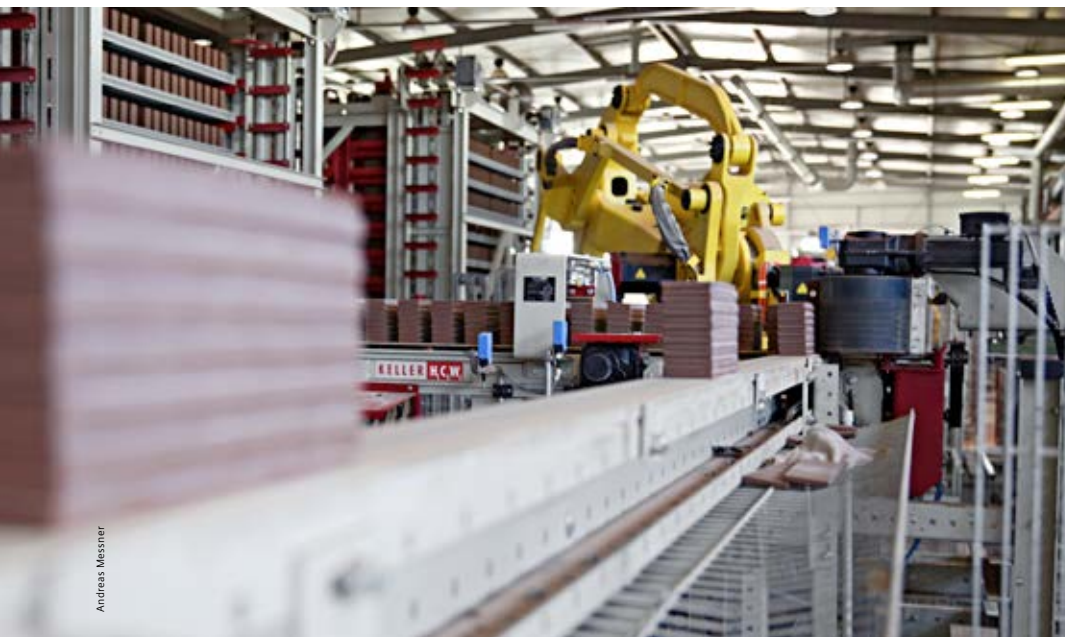
"In consideration of this huge investment, it was decisive for us to have a reliable partner at our side that would be able to design and build the entire plant and to also support us with regards to service," explains Szymkowiak. This is why Keller HCW, a leading supplier of complete plants for heavy clay production, headquartered in Lower Saxony, has been entrusted with the project realization. Josef Schröter, head of the electrical engineering, automation, and process engineering department at Keller HCW, describes the situation: "Ceramic producers demand extremely high availability from their plants. Integrated automation solutions such as Siemens offers with Totally Integrated Automation (TIA) are perfect for that."

**Keller HCW GmbH, Germany**

## Clear advantage for brick production

**In a new production facility for quarter bricks in Poland, Keller HCW GmbH implemented a new uniform operating and visualization concept for the first time. In addition to achieving savings in construction and installation, engineering costs were also reduced with the help of the new TIA Portal engineering framework.**

The engineering framework TIA Portal convinces in the new brick production facility in Poland through greatly simplifying the entire engineering process since all editors are accessing one common database



## Intuitive and user-friendly HMI

Some significant innovations have been implemented for the first time in the Przysucha project. One example is the use of innovative KP8F Key Panels on operator panels within the production line instead of conventional long-travel keys. The advantage is obvious for Schröter: "With this system we have eight keys available that can be assigned as desired by means of software programming. At the same time, we are able to integrate the plant's emergency stop button into our safety concept thanks to the fail-safe input of the KP8F." Communication between the Simatic HMI Comfort Panel and the fail-safe control is carried out via Profinet. At the same time, the 24-V DC power supply can be connected and looped through in the key panel. That makes installation quick and saves not only wiring but also space, time, and costs as compared to a key button solution. With the help of the integrated Profisafe communication, information is forwarded reliably to the fail-safe Simatic S7 control when the emergency stop button on the operator panel is pushed. Separate emergency stop contactor combinations can be completely eliminated, and all the system diagnostics are already integrated into the hardware and software, ready for operation.

The actual visualization of the plant is realized using Simatic HMI Comfort Panels with touch function, which can be easily integrated into the communication structure of the brick production line via Profinet. With their high-resolution widescreen display, these devices are the perfect solution for the very detailed visualization of subprocesses, parameters, and diagnostic messages that are made avail-

able automatically via the control. Szymkowiak concludes: "Our colleagues in the production department are very happy about the intuitive and user-friendly operation that both the Key Panels and Touch Panels provide."

## Consistency in engineering

For the first time ever, to complement the innovative solutions for the operation and visualization of the plant, the project team at Keller HCW also used the innovative TIA Portal engineering framework to connect the new Comfort Panels to the Simatic controls. The first step was to continue configuring the controls with Step 7, but the aim is to migrate PLC programming into TIA Portal completely to save even more time in the future. Schröter is very excited about the possibilities of this new software. While the previous routines with familiar tools are retained for operation, all editors in TIA Portal are accessing one common database. To integrate the KP8F Key Panels, for instance, it was only necessary to select the appropriate unit from a given list and to assign the desired parameters to it. The same applies for the Comfort Panels and the other Siemens devices within the plant automation system. "As a result, the time-consuming transfer of information from one program to the other is now a thing of the past," says the head of the department. Even safety-related applications can be developed more easily in parallel to standard automation thanks to TIA Portal – and as the example of the KP8F Key Panel shows, without great effort in terms of hardware and software, even right down to the field level. Schröter concludes: "Thanks to the porting of the software to the panels we are able to operate all the machines using a single tool."

## TIA is a great success

In the Polish brick production line, Keller HCW implemented significant optimization measures that should subsequently have an effect on many other plants as well. The adoption of operating and visualization solutions in connection with TIA Portal is a clear technical advance for the Polish company and significantly reduces engineering effort. Time savings due to reduced wiring effort and easier plant expansion are just two positive side effects. In addition, downtimes and service times are considerably reduced thanks to integrated system diagnostics – important reasons for Schröter and Szymkowiak to consistently implement Totally Integrated Automation over the long term. ■

The KP8F key panels can be configured individually with the software



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HeidelbergCement AG, Germany

# Up-to-date cement mills

In the context of a retrofitting pilot project, a classifier in a HeidelbergCement cement mill was equipped with new drive technology consisting of energy-efficient motors and the corresponding frequency inverters. The entire seamless drivetrain has optimum control and energy-consumption parameters.

**W**ith about 52,000 employees at more than 2,500 sites, HeidelbergCement AG is one of the largest manufacturers of construction materials worldwide. A retrofitting pilot project involving classifiers was started in early 2013 at the factory in Lengfurt, Germany. The large drive motors of one fan and one classifier in one of the three cement mills dating from the 1980s were replaced by Simotics FD (Flexible Duty) asynchronous AC motors. These new motors impress with their high flexibility in terms of equipment and cooling and also have a high power density and overload capability.

## Simple conversion to modern technology

Clinker bricks, plaster, and ground granulated slag are ground into cement

in cement mill No. 7 in Lengfurt, a 16-m ball mill with a diameter of 4.4 m, and then transported upward with a bucket elevator. The mixture is classified via the rotary movement of the classifier together with the help of wind provided by a fan. This means that fine cement dust is separated out, while the larger particles drop down into the cement mill to be ground again.

The classifier and fan are moved by one 315-kW Simotics FD motor each. The factory owners chose to invest in new technology because both the frequency inverter and the motors were very old and no longer state of the art in terms of energy efficiency. "Energy efficiency is a topic that keeps coming up here," explains Wolfgang Przyklenk, master electrician at HeidelbergCement's Lengfurt factory. "That's why we immediately opted for the highly ef-

ficient Simotic motors with Premium Efficiency." The decision was made easier by the fact that the conversion could be accomplished effortlessly. The control cabinets containing the two Sinamics G150 frequency inverters were delivered completely assembled and connected – commissioning by the equipment supplier included. "The entire retrofitting project was completed without any problems," Przyklenk says.

Another advantage of the new motor series is its inverter-optimized design. The individual components were perfectly coordinated with Integrated Drive Systems (IDS), the comprehensive approach to the entire drivetrain from control to motor. For example, while analog signals were exchanged between the frequency inverter and the control system with the previous





The classifier of one of the cement mills was equipped with energy-efficient 315-kW drives with Premium Efficiency

Siemens AG



The new Simotics FD asynchronous AC motors are more compact, do not have cooling fins on the outside, and have a high overload capability

Siemens AG

## Advantages

### Simotics FD

- High flexibility due to the modular design, with different cooling methods and positioning possibilities for accessories and separately driven fans
- Usable in many applications in the processing industry (due among other things to explosion protection for Zones 2 or 22) and in the manufacturing industry
- Compact motor design through increased power density
- High overload capability due to an inverter-optimized design
- Broad range of options, including an industrial version for marine use
- Improved service offering
- Simplified retrofitting using the same dimensions of mounting-foot holes as the N-compact motor series

solution, now a digital Profibus connection ensures optimum communication.

### Detailed design solutions for rugged operating conditions

Przyklenk also sees advantages in the design of the new motor series compared to the drives that had been used previously. For one thing, the motors are cooled exactly where heat loss arises by using cooling fins in the active part. This enables efficient cooling by reducing heat transfer resistance. Furthermore, the cooling fins on the active part are protected from dust and dirt deposition when the motors are shut off. The motors are also equipped with temperature monitoring for the coils and bearings. The corresponding data are gathered and monitored using the

Siemens control system at the Lengfurt factory. Additionally, for the entire one-year pilot phase, a condition monitoring system that records and evaluates all results has been installed. A further advantage of the new Simotics FD motors is the easy removal of old lubricants. During the routine regreasing of the bearings, any excess lubricant can be easily removed through the motor's outlet.

### Sustainability with seamless drive technology

The retrofitting pilot project at the Lengfurt factory of HeidelbergCement has proven to be a complete success in many ways. The investment in modern drive technology consisting of Simotics FD motors in combination with Sinamics G150 frequency inverters has shown

that with the right technology, energy can be saved without requiring elaborate conversion work. Also, by perfectly coordinating the drivetrain in accordance with IDS, the drives can be easily adjusted to the underlying conditions with great precision and ease. Przyklenk sums up: "The new Simotics FD electric motors, together with the IDS strategy, are the perfect solution for our requirements when it comes to retrofitting our plants sustainably and easily to energy-efficient drive systems." ■

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## Drive Train Condition Monitoring

# Integrated service for perfect drives

Integrated Drive Systems (IDS) turn simple drive components into real systems – through the perfect integration of all the components. As is shown in the interview with Dr. Jörg Deckers, senior key expert for condition monitoring, and Klaus Selbach, product manager for Drive Train Condition Monitoring, integration is a big issue – and not only in the product business.

“In Drive Train Condition Monitoring the full importance of integrated solutions becomes apparent: with the drivetrain and CMS coming from one source, you can productively understand the interactions between the components.”

Dr. Jörg Deckers (right), Senior Key Expert for Condition Monitoring, and Klaus Selbach, Product Manager for Drive Train Condition Monitoring, Siemens AG



**Dr. Deckers, Mr. Selbach, you are working together on many customer projects. Why is integration of such significance, especially when it comes to drive systems?**

**Deckers:** In a drivetrain, the weakest link in the chain defines performance, availability, and efficiency, but only in an integrated solution all the components are perfectly synchronized, which reduces the likeliness of one link of the chain being too weak and breaking down early.

**Which problems are usually encountered with drivetrains coming from different manufacturers?**

**Deckers:** Especially difficulties with interfaces and interaction may cause problems in a drivetrain. If you

buy a converter, motor, coupling, and gear unit from different suppliers and combine them into one drivetrain according to the product catalogs, they may work well together. However, often something goes wrong, and then you start to search for someone to “blame.” This is not the case if customers have only one contact.

**Selbach:** This is an important aspect: contact and responsibility. This is where our customer service comes in. The full importance of integrated solutions becomes apparent especially when it comes to service.

**In what way?**

**Deckers:** Service is about keeping the number of interfaces as small as possible. In the case of our IDS drivetrain, customers have one contact who coordi-

nates the entire project. Apart from that, it is important to make use of synergies. If the drive is due for maintenance, the motor can be maintained at the same time. That saves a lot of time and money.

**Selbach:** Look at proactive services such as Drive Train Condition Monitoring: if both the drivetrain and the condition monitoring system come from Siemens, our experts know exactly which components and parts have been installed and can consider this in their analysis. This is the only way to productively understand the interactions between the components within the drivetrain.

**Are you involved in the development process of products as well?**

**Selbach:** As service experts, we are involved in all stages of the product's lifecycle, from defining the product to the point where all the components are perfectly synchronized at the operating stage. A very



Siemens AG

good example of the interplay between the product and service businesses is the integration of service offerings into new business. Throughout the entire serviceability process we jointly make sure that service offerings such as Drive Train Condition Monitoring can be ordered directly with the new IDS in the future. If products have reached the end of their lifecycle, the service department supports customers with the planning and implementation of retrofits. Customers benefit from this close cooperation in the end, as service effort and costs are kept to a minimum.

**Do you have a concrete customer example?**

**Deckers:** Certainly! We developed one of my first IDS projects for a customer in Balaji, India. The

drive system there was very complex, consisting of four converter-driven motors, couplings, and gears, acting together on one gearwheel. During drive construction, my fellow mechanical engineers and I still had some doubts about whether we could successfully control the four mechanically coupled motors. The Drive Train Condition Monitoring system that was already installed provided the necessary confirmation. So far, everything is running smoothly and in an energy-efficient manner, which we can check on at any time via remote access.

**In what direction will service relating to industrial drive systems develop in the coming years?**

**Selbach:** Our products are used all over the globe, sometimes in the most isolated places you can imagine: in deserts, on oil platforms, on ships, and even under water. The massive expansion of fast Internet connections and the possibilities of data storage open up opportunities for new service businesses here. I therefore assume that we will see a strong extension of remote services worldwide – and not only for mechanical systems.

**Deckers:** In view of the IT revolution we can also expect decreasing costs for measuring technology and IT and that the data flow from different sources will be analyzed more intelligently. Stocking spare parts becomes easier to plan as measuring results and service assignments are statistically evaluated. As a result, storage costs will decrease and delivery times become shorter. All this has a positive effect on the lifecycle costs and the availability of our customers' systems.


**Selbach:** That's right! And we will increasingly handle all this by concluding long-term service agreements. Thus, our customers get guaranteed availability at fixed prices and can focus on their core business – production. Here is a fact our customers can rely on: we are a one-stop shop providing everything from product development to after-sales service, for maximum availability and productivity.

**Gentlemen, thank you very much for the interview!**

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Not only is the R80XL the world's largest transportable Ferris wheel, but it also sets entirely new standards when it comes to safety, efficiency, and comfort

Maurer German Wheels GmbH, Germany

# Strong momentum for steel giants

**It is possible to hang 80 m above the ground with the world's largest transportable Ferris wheels, designed by Bussink Design and built and tested by Maurer German Wheels in Munich. Modern automation and integrated drive systems ensure not only a high level of safety but also greater energy efficiency during operation.**

**M**any people from Munich are already familiar with it – the world's largest transportable Ferris wheel, with a height of 80 m, a diameter of 74 m, a weight of 750 t, and 27 passenger cabins. The venue is the premises of Maurer German

operators. Siemens provided all the electronic components as well as the drive systems and the integrated automation based on TIA Portal.

#### **Intelligent redundancy concept for maximum safety**

When it comes to safety, the R80XL meets the highest standards. It is equipped with a fail-safe S7-300F which has been designed in a redundant manner. It has one active Simatic S7-300F, and another is available as a backup and can be activated at any time. Furthermore, all the switching technology has been distributed in two redundant, spatially separate electrical containers. Even in the event of a full power failure, the Ferris wheel is well equipped: it has an emergency generator, but it can also resort to gravity itself. Due to the high quality of the bearings, the mass center of the wheel automatically shifts downward until the last cabin has been emptied. This makes it possible to completely evacuate the wheel at any time.

#### **Technology at a glance**

- Fail-safe Simatic S7-300F for the wheel's entire control system
- TIA Portal to monitor and control the functions in the 27 cabins
- 8 Simotics GP motors monitored by a condition monitoring system
- Sinamics G120 frequency inverter for application-specific rotational speed regulation
- Industrial Wireless LAN



Each of the eight drive motors of the R80XL has its own final control device that perfectly regulates contact pressure. Motors from the Simotics GP series are integrated

Wheels GmbH at Frankfurter Ring. In the past two years, the model R80XL steel giant has been assembled twice for testing. After undergoing intense technical testing, its market can be found in the large metropolises of the world, where the Ferris wheel will be a tourist attraction for a limited period of time. The first version, for example, is currently turning under the name "Star of Puebla" in Mexico. Such a giant poses an enormous technical challenge to the

#### **Integrated drive concept with high energy efficiency**

For the drives, the R80XL is equipped with eight motors from the Simotics GP series, whose supply systems are intelligently networked via Profinet and are constantly monitored using a condition monitoring system. The force is transmitted indirectly via the drive gears that drive the wheel at different ►►





Siemens AG / H. Breiter

The application was implemented using a modular Sinamics G120 inverter

points along its outer ring and that are always pressed against the wheel with optimum contact pressure by using intelligent final control devices. In addition, each of the eight motors has its own Sinamics G120 inverter. This extremely compact frequency inverter controls the rotational speed in a targeted, application-specific manner; reduces wear and tear; and enables braking energy to be recovered and fed back into the local power supply grid. "Thanks to Integrated Drive Systems, all the components of the drive system are seamlessly integrated not only horizontally but also vertically during the entire lifecycle. This leads to increased efficiency and long-term availability," explains Wolfgang Sanders, specialist for fairground rides at Siemens in Bremen. Furthermore, combining automation and inverter technology eliminates cost-intensive load peaks when the wheel starts up. Marcel Moesler, Technical Flying Doctor at Bussink Services, adds: "In reality, it is possible for us to store the maximum load in the system, and the automation takes care of everything else." The engineers have also created energy-efficient solutions for the lighting and have equipped the wheel exclusively with LED lights. Compared to traditional lighting, this can result in up to 90% energy savings. It also reduces the daily amount of work involved in changing countless burned-out lightbulbs.

### Everything under control

The wheel is controlled and driven from a central operator's platform from which the operator has a complete visual and technical overview of the equipment. Automation with TIA Portal also contributes to loading the wheel smoothly. Since all 27 cabins con-

stantly transmit information on their status via Industrial Wireless LAN and the ticketing system on the front continuously communicates the number of passengers standing in line, the Ferris wheel's loading program can load the cabins in an ideal manner and distribute the weight statically correct, which is an enormous advantage, especially when the wheel is starting up. The functions of the fully air-conditioned cabins equipped with information and communications technology, as well as the lighting, are controlled and monitored via TIA Portal. Sanders sums up the advantages: "The wheel is gigantic. With intense monitoring, we can diagnose errors immediately and take the appropriate countermeasures."

### Implementation with plug and play

With TIA Portal and networking via Profinet and IWLAN, integrating new elements is extremely easy. "In both wheels we have built thus far, it was no problem to add extensions. We ordered a part at Siemens, it was delivered, we plugged it in, and it worked – so it's basically plug and play," reports Moesler enthusiastically. Another advantage for future operators of the Ferris wheel: all the wheel's components fit into standard sea containers, and all the required Siemens components are available worldwide. Moesler is certain that the success story won't end here: "Interest in the wheel is huge." ■

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## Sitrain courses

# Hands-on Profinet training

Whether it is basic, advanced, or specialized knowledge, with the Sitrain training program users can acquire directly applicable know-how faster – straight from the market leader in industry automation. Siemens offers a broad range of training opportunities, from classroom courses to online learning media, that can be adapted in a flexible and targeted manner according to the training needs.



With blended learning, students gain practical knowledge of the possible uses of Profinet in automation

Device and I-Device, controller-controller communication with T-communication blocks, and integrated web services on Profinet devices.

## Success for a large target group

Knowledge of Simatic Step 7 V5.x as taught in the Simatic courses Simatic S7 Programming 2 (order code: ST-PRO2) and Simatic S7 Service Training 2 (order code: ST-SERV2) is required for this course. An online entrance test helps students to self-assess their knowledge, whether they are programmers, commissioners, engineers, maintenance and service personnel, or operators. Numerous practical exercises reinforce the theoretical knowledge acquired, and the classroom course is further complemented by web-based training on Industrial Ethernet. This concept is known as blended learning.

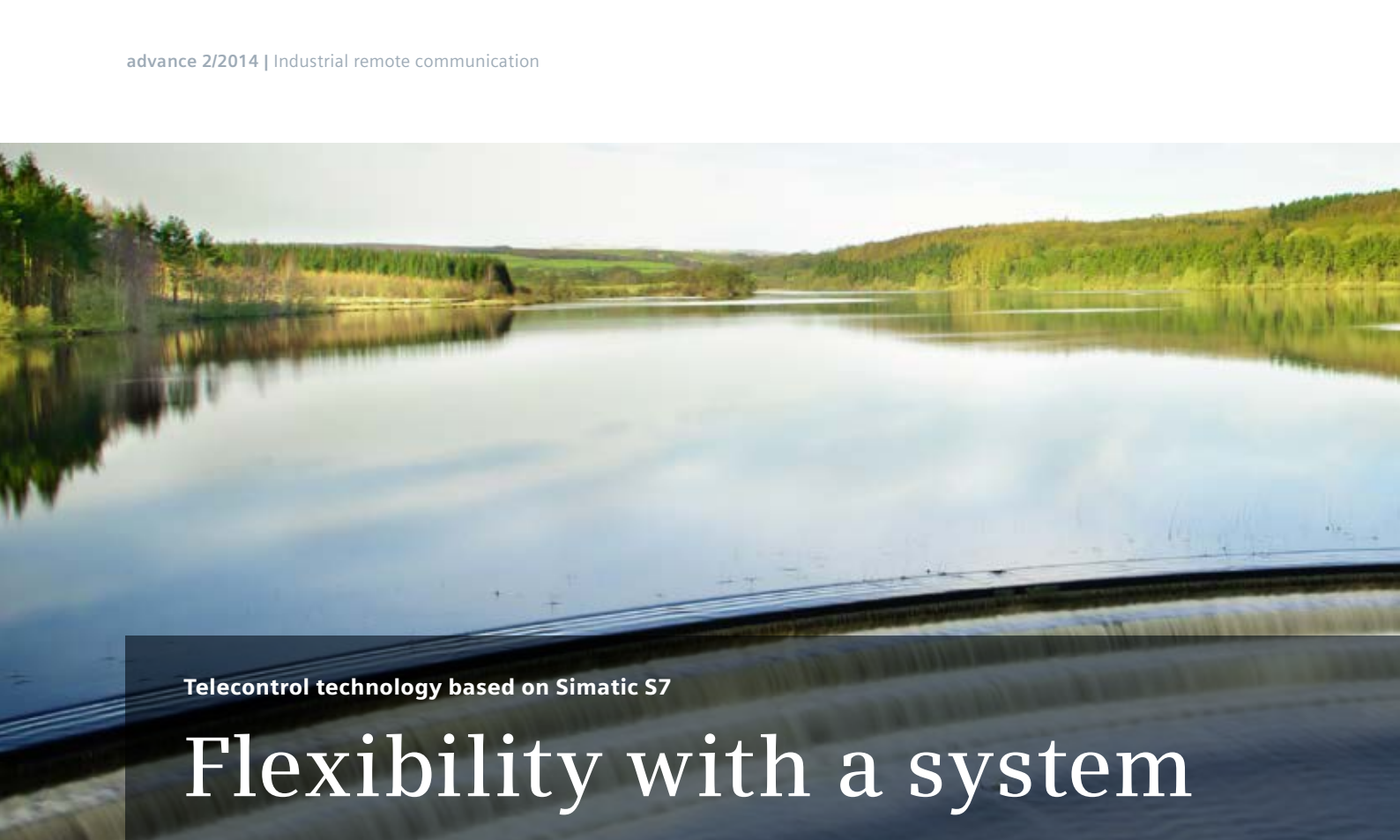
For those who wish to learn more about message frame structure and message frame diagnostics with Profinet Analyzer/Oscilloscope, the Certified Profinet Network Engineer course (order code: IK-PNOCPE) is recommended. ■

**S**itrain offers a special Profinet system course on industrial communication. After completing the course, students will be able to quickly and effectively parameterize, start up, and troubleshoot Profinet networks using Simatic components. The three-day Profinet system course (order code: IK-PNSYS) from Sitrain gives the students the opportunity to get to know

Profinet as the Industrial Ethernet standard for automation. The participants are taught the basics of the IO Profinet fieldbus systems along with engineering and programming, as well as Profinet RT&IRT and media redundancy. They also learn about engineering and diagnostics across the entire plant using engineering tools. Finally, the students learn how to use and configure Shared

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Telecontrol technology based on Simatic S7

# Flexibility with a system

Telecontrol technology is gaining increasing importance in the context of supplying cities with water. The automation stations of the supply systems are geographically widely dispersed and must be monitored and controlled via a centralized control system. New product offerings for the Simatic S7 automation system that meet current challenges are constantly being introduced – for example, secure data transmission and data protection with easy engineering.

**R**apid urbanization, growing populations, and the need to distribute energy in a more efficient and targeted manner pose great challenges to manufacturers of water and wastewater, gas, and district heating supply systems. In the future, they will need to design larger and more flexible systems while at the same time maintaining a high quality standard. Telecontrol technology to connect remote terminal units (RTUs) to the control system will be crucial in meeting this challenge. Control technology based on Simatic S7 allows RTUs to be easily and flexibly integrated into the system control center and broad telecontrol systems with networked structures to be set up.

## For low and high degrees of automation

The TeleControl Basic system is a good choice for telecontrol technology solutions with a low degree of automation and for low-cost fault signaling systems. This system is appropriate for control systems in the lower efficiency range and stands out due to its optimized transmission protocol with low transmission volume. The concept is as suitable for small applications with few RTUs as it is for larger projects with thousands of RTUs. The flexible TeleControl Professional system with controllers for the mid and high efficiency range can be used when many telecontrol tasks need to be carried out for the

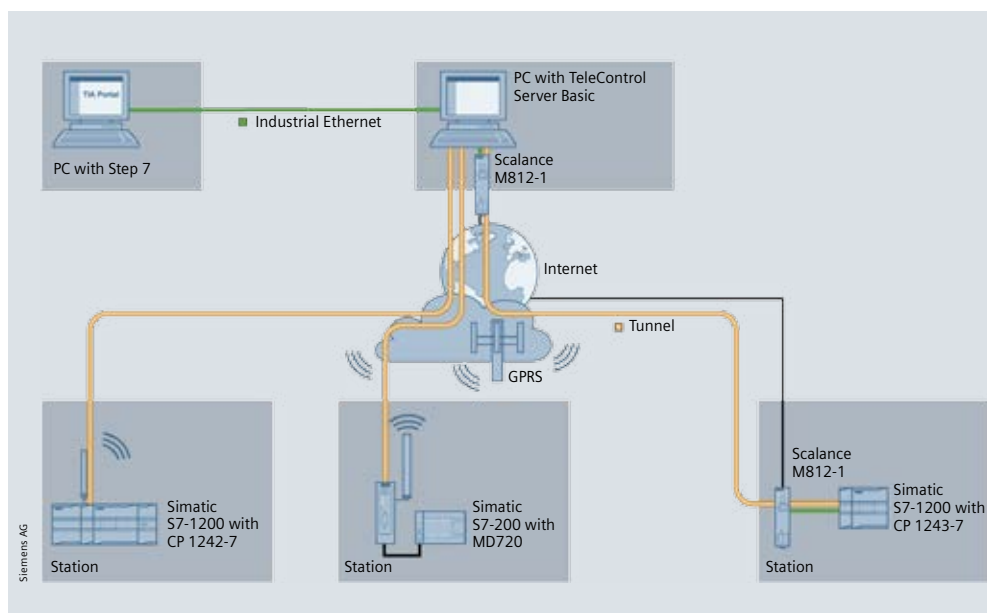
fully automatic monitoring and control in process automation of one or more control centers. Standards such as DNP3 and IEC 60870 as well as tried and tested protocols such as Sinaut ST7 are used as transmission protocols.

## Simatic S7-1200 for telecontrol

Simatic S7-1200 is a special PLC for simple automation tasks that makes it possible to use telecontrol media and a variety of protocols due to its modular design. Furthermore, by using the TIA Portal Step 7 engineering tool for engineering and programming, it is possible to easily archive the application data that are often necessary for telecontrol solutions using predefined mechanisms



Getty Images / Billy Richards Photography



With TeleControl Server Basic, remote terminal units based on Simatic S7-1200 and S7-200 can be linked to the central station via GPRS or Ethernet

within the control system. Another advantage Simatic S7-1200 offers is communication modules that make it possible to transmit data from the RTU to the central station without any programming effort. This prevents errors and ensures that the system can meet the high demands regarding data consistency, buffer storage in case of a connection failure or ensuring the correct sequential order of the data. By connecting the CP1243-1 module to the S7-1200, all measured values relevant to the control system can be directly transmitted to the central station. Then the CPU's relevant data for the control center are selected in Step 7 and linked with the transmission parameters in a clearly structured menu.

### Safety first!

In the industrial environment, connection failures can have fatal consequences, as measured values might be falsified or errors might not even be identified. For this reason, automated mechanisms to buffer data have been integrated into the S7 telecontrol modules, for example, in module CP1243-1. In the event of a connection failure, up

to 64,000 values are automatically buffered. To ensure that the data are sorted in the correct sequential order later, the values are provided with a current time stamp when they are buffered. Some situations, however, require the service engineer to act immediately. For such cases, notification e-mails that have a defined text and recipient list for determined incidents can be programmed. Should an incident occur, an automatic e-mail is sent to the service engineer, who can then check on-site to see whether there was any damage and whether it can be quickly repaired.

If the RTU is somewhere where no cable connectivity is possible, an existing mobile network can be used to support telemonitoring. Depending on the chosen telecontrol system, the RTU has an integrated mobile network interface; alternatively, the station can be equipped with a mobile network router. With the extended Scalance M product portfolio, which includes both mobile network routers and DSL routers, users will find the right networking component for every individual application scenario. Integrated security concepts, firewalls, and VPNs protect the commu-

nications systems from unauthorized external access. To achieve high process availability, the transmission network can be set up redundantly.

### Standardization reduces costs

An additional important factor in the successful implementation of telecontrol solutions is the use of open communications standards. Introducing established standards such as DNP3 and IEC 60870 allows significant software implementation, testing, and conformity audit costs to be saved. The security mechanisms used to authenticate substations at the control center that have already been defined in the standards are a good basis for compliance with the security requirements of end applications. ■

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At Volkswagen in Wolfsburg, vibration sensors in press line 400 monitor the status of the main motor's bearings

Volkswagen AG

Volkswagen AG, Germany

# Efficiency in the press shop

In its press shop in Wolfsburg, Germany, Volkswagen AG has established its own condition monitoring team, which is systematically implementing an integrated solution for condition-dependent maintenance. The goals are trouble-free production and maximum availability of the press lines. Initial experience shows that it is possible to save not only time and money this way, but also energy.



Volkswagen AG

The Siplus CMS X-Tools software analyzes, visualizes, and archives the measurement data and provides corresponding indications on the condition of machines and plants

About 67,000 employees manufacture around 3,800 vehicles every day in the Volkswagen factory in Wolfsburg. In this press shop alone – the largest of the entire group – approximately 2,000 employees help produce 400,000 auto-body components from 2,500 t of steel on the 38 plants every day. After initial studies showed that both efficiency and production could be optimized through condition monitoring, Volkswagen and Siemens together developed a comprehensive solution for the electrotechnical equipment of the press shop. “With the condition monitoring system, we were able to plan the replacement of a bearing in good time,” says Dipl.-Ing. Florian Becker, head of the condition monitoring team in the Volkswagen press shop in Wolfsburg. The bearing in question was that of a flywheel with a weight of about 10 to 15 t in press line 400. Seven of the large press lines had already been equipped with the Siplus CMS4000 condition monitoring system (CMS) by the end of 2013.

### Precise diagnostics with powerful software

A maximum of six vibration sensors can be connected to the hardware of the CMS4000, that is, to the interface nodes. Due to the high sampling frequency of up to 192 kHz, it is possible to record vibrations that can be compared to the manufacturers' transmission and motor specifications in order to detect gradual or sudden changes in the frequency response. In addition, many other plant and operating data flow into the CMS as well, such as the purity levels of the hydraulic oil, oil temperatures, water content of hydraulic fluids, currents, vibrations, and pressures. For example, more than 300 measuring points are merged in the central control system of press line 400, an industrial PC from Siemens. The art in this process is the intelligent evaluation of the data, not their generation.

Volkswagen uses the Siplus CMS X-Tools software for the evaluation. With it, data are analyzed, visualized, and archived. Users can enter the desired coverage as well as the permissible range of values in the software and thus automatically document any deviations. A traffic-light function with different colors ensures fast visual detection. This way, the employees in the Volkswagen press shop can measure, for example, the vibrations on bearings, transmissions, and so on at 15-minute intervals. Each measurement takes about 30 seconds. The measurement cycles are set up in X-Tools individually, depending on the components. The same, of course, also applies to the remaining measured values such as pressures, currents, and so on. From this information, the operators can read trends and also immediately detect sudden changes in condition.

### Improving energy efficiency

Condition monitoring can also contribute to increasing energy efficiency. Nonconformance and optimi-

## Advantages of Siplus CMS4000

- Open software design for industry-specific extensions
- Creation and protection of customized analysis models based on off-the-shelf function blocks
- Optimized for reaction-free integration into existing and new automation plants
- Quality assurance for production processes through black box functions
- Detailed analysis, diagnostics, visualization, and archiving
- Continuous monitoring of rolling bearings, transmissions, fans, pumps, machines – all the way to low-frequency tower vibrations

zation potential can be determined through the evaluation of consumption data, especially during downtimes, and energy can also be saved through the timely implementation of maintenance measures. For example, a leak in the compressed air network would be detected through the data evaluation in condition monitoring. Moreover, despite the fact that production sequences have already been energy optimized, there are still devices that require energy even when they are not used in the production process. These include claws in the suction presses, electrical drives, and hydraulic pumps. For this reason, the CMS and the exact consumption flows should be openly accessible from the shopfloor, the plants, and the control station. It is, of course, possible to code the system in a role-based manner, so that data can only be seen and adjusted by those employees who are authorized to handle them in accordance with their positions.

### Systematic increase in cost-effectiveness

Experience so far clearly shows the benefits of carefully planned condition monitoring. Thanks to the option to incorporate numerous values from the automation level, such as current, voltage, and so on, the project team was able to save a great deal of money. With the Siplus CMS4000 interface nodes as hardware and the Siplus CMS X-Tools software, the team was able to set up a comprehensive system for the technical monitoring of press lines in the press shop at Volkswagen AG with only relatively little additional installation effort. ■

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## Object recognition with Simatic MV440

# Identify objects quickly and reliably

Today, object recognition is a standard task in automation and indispensable in a modern production facility. Siemens offers components and technologies for object recognition that take into account the impact of the industrial production environment and the material characteristics of the products as well as special applications.

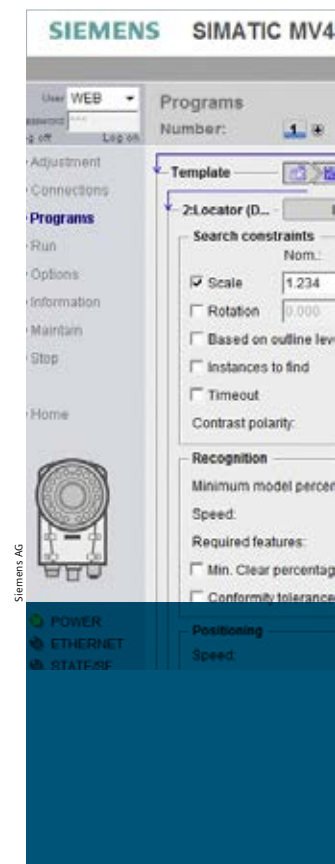
**T**he need for industrial identification exists across all industries. With the Simatic Ident product portfolio, Siemens offers both RFID systems on the basis of radio waves as well as optical reading systems for identifying 1D and 2D codes, plain writing, and objects – depending on the application – for identification applications in production and logistics. This ensures gap-free traceability of products and components throughout all production, procurement, and shipping processes.

### Object recognition with optical reading systems

The oldest form of identification is object recognition, whereby an object is clearly identified based on specific characteristics; no special marking (code) is required. The most powerful optical reading system in the Simatic Ident portfolio, the Simatic MV440, now also provides object recognition in addition to code reading and text

recognition. With PAT-Genius, Siemens offers license software for object recognition for the Simatic MV440, which achieves a scan rate of up to 2,500 scans per minute. This software can be loaded onto the MV440 with a plug-in via the Simatic Automation License

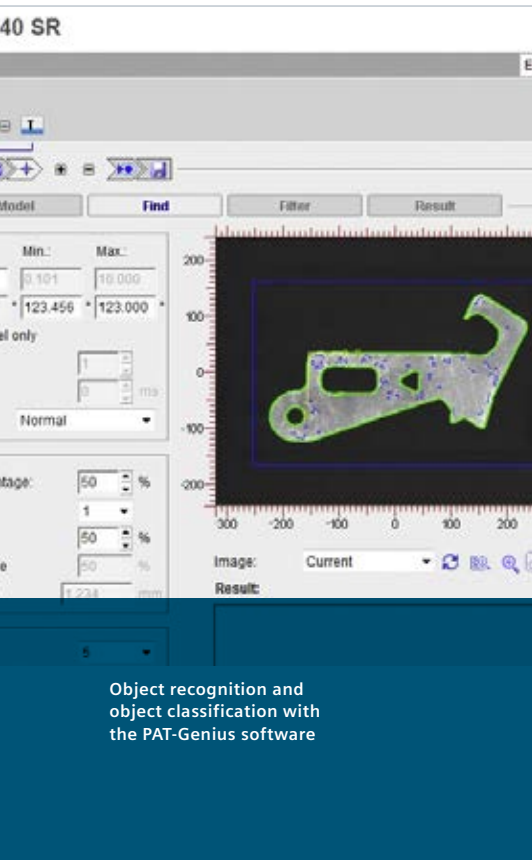
Manager. PAT-Genius is used, for example, for quality control in production by comparing the shape of an object with a specified shape. In assembly, the software can perform presence detection via classification and position recognition by comparing to specified nominal



### Advantages

- High scan rate of up to 2,500 scans per minute
- Parameterization without specialized knowledge
- Diverse applications in different industries
- Flexible combination of object recognition with code reading and text recognition
- Easy system integration with function blocks for all Simatic and Simotion systems as well as a configuration file for Sinumerik systems





Object recognition and object classification with the PAT-Genius software



The Simatic MV440 optical reading systems offer text recognition and object recognition functions in addition to reading 1D and 2D codes

values. PAT-Genius enables position recognition or quantity monitoring in supply engineering as well. It is also possible to use object recognition and text recognition together. For example, with object recognition a lettered medium (e.g., a label) can be localized, or text recognition can be supported by determining the number of objects to be read. Similarly, object recognition can be used to enhance text recognition by scanning for the presence of any warning signs, symbols, logos, and so on.

### Easy system integration

For successful industrial identification, the recognition system must be integrated into the automation technology. The Simatic communication modules can be seamlessly integrated into Profibus, Profinet, or Industrial Ethernet systems. Standard protocols offer comprehensive diagnostic functions that optimally support the location and

correction of faults, thus minimizing commissioning time and plant downtimes. Integration into the overall control process of the plant is an important component of system integration – especially for object recognition systems. To facilitate this integration, system-tested function blocks are available for Simatic S7 and Simotion as well as for linking to Sinumerik control systems. Since these blocks are stored in TIA Portal's engineering framework, they do not need to be created and tested for every project. This ensures an integrated solution and saves effort and money.

In addition to linking to the control system, object recognition should also be easily connected with the visualization system of the plant. Simatic Ident products support the integration of visualization into existing Simatic HMI devices as well as into devices made by third-party manufacturers. Separate visualization hardware for the implementation of the object recognition

function into the overall plant is not necessary. During normal operation, the visualization device is used for displaying the overall status of the plant; in the case of a fault, it supplies the machine operator with important indications specific to the optical scan equipment. In the case of optical read devices made by Siemens, the use of the integrated web-based operator interface either as a stand-alone version or as an integral part of a plant operator interface is especially easy. The operator can use the existing interface without having to perform any tests or integrate the device via customer-specific visualization. ■

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From heavy-duty electromechanical equipment to highly sensitive electronics, in modern plants and machines all the 24-V loads are often supplied by a single regulated switching power supply. To avoid a drop in the output voltage of the power supply unit due to a single load fault, the 24-V supply circuit is divided into individual subcircuits and selectively secured.

### Optimized for switching power supplies

With conventional miniature circuit breakers, it is hardly possible to achieve the desired selective shut-down in case of a fault. In order to trip within only a

few milliseconds, that is, in the electromagnetic range, these circuit breakers need a multiple of the rated current. However, a fast tripping is only possible up to certain cable lengths and from larger cable cross sections because high line resistance prevents the flow of the necessary tripping current.

The electronic Sitop PSE200U selectivity module is designed specifically for switching power supplies; it permits short-term peak loads and disconnects in the case of extended overloads. This way, even long lines, where the short-circuit current is limited by the high resistive load, can be reliably secured. The electronic equipment constantly monitors the 24-V input voltage. As soon as the 24-V DC threatens to

#### Sitop PSE200U

## Selective monitoring and diagnosing

To achieve high productivity of automated plants and machines, a reliable 24-V power supply is absolutely necessary. An electronic Sitop selectivity module reliably monitors 24-V load circuits and eliminates unwanted impacts on the used power supply. Channel-exact fault diagnosis in Simatic S7 enables rapid detection of the error source and minimizes the possible downtimes.



fail, the path with a higher current than the set current is disconnected immediately. The supply of all other circuits continues without interruption. Even a PLC which can only bridge power failures for a few milliseconds continues to run without problems.

### Fast and channel-exact diagnostics in Simatic S7

In case of a fault, an LED on the device indicates exactly the faulty channel and, depending on the device version, the fault is reported either via a common signaling contact or as a single-channel signaling. For channel-exact evaluation in the PLC program and for the versions with a common signaling contact, all four channels must be wired to a digital input module of the PLC. The selectivity module with single-channel signaling carries out this task with significantly less cost and time; it is only necessary to connect the signal output, which cyclically sends the status of the four channels via pulse-pause protocol, with a standard digital input of the PLC. This makes it possible to identify one or several faulty load circuits via the controller. A break in the signal wire between the selectivity module and the input module can also be detected. Free function blocks for Simatic S7-300/400/1200/1500 for Step 7 and TIA Portal as well as for Simotion Scout and Simotion CPUs are available as downloads for evaluation. This enables fast and easy integration into the plant diagnostics system as well as into higher-level control, operating, and monitoring systems.

Free application examples for easy integration into automation are also available for download for both Simatic S7-300/400/1200/1500 and Simotion CPUs, which can be used as suggestions or as the

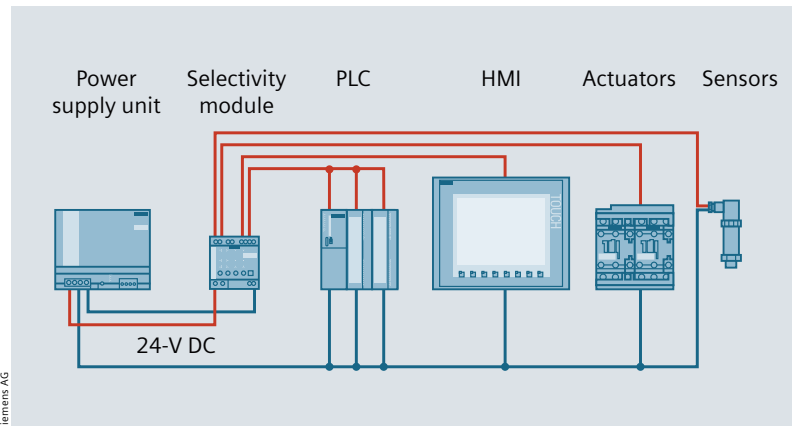
basis for individual solutions. The examples contain descriptions, function blocks, and programs for evaluation in the controller and visualization on a Simatic panel.

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**Downloads of function blocks and application descriptions for Simatic S7: [sie.ag/1qccnHs](http://sie.ag/1qccnHs)**  
**Simotion: [sie.ag/YbMehB](http://sie.ag/YbMehB)**

In case of an imminent drop in the 24-V voltage supply, faulty circuits are immediately disconnected by the selectivity module; supply to the remaining circuits continues without interruption



### Advantages

- Four load circuits per module, in two versions, with an adjustable output current range of 0.5–3 A or 3–10 A
- Safe disconnection even in case of low short-circuit current – for example, due to long lines, small wire cross sections, or creeping short circuits
- Uninterrupted operation of loads through immediate disconnection of faulty circuits in case of an imminent voltage drop
- Manual reset and remote reset from a central location
- Easy commissioning through manual on/off switching of channels
- Sequential connection of the loads to reduce the overall inrush current
- Sealable transparent cover over the device for current and time settings to prevent unintentional changes
- Failure diagnosis via LEDs and remote diagnostics in two versions: common signaling contact or single-channel signaling
- Evaluation via free function blocks for Simatic S7-300/400/1200/1500 or Simotion CPUs for modules with single-channel signaling



Luigi Bandera S.p.A., Italy

# Foilmachines geared up flexibly

Bandera is an Italian manufacturer of extrusion lines used for processing thermoplastic materials. As part of a modernization project, the company decided to implement the compact and versatile Sirius 3RM1 motor starters to bring its production up to the state of the art.

**B**andera has been producing extrusion lines in Italy since 1947. From its founding to the present day, the company has continued to grow and evolve, especially during the period of economic growth following the Second World War, when the demand for machinery reached its peak. Bandera contributed significantly to Italy's industrialization then, by producing thousands of extruders. Continually introducing technological innovations in this field and keeping a close eye on market developments, Bandera is one of the leading manufacturers of extrusion lines for blown film and flat molding of films, foils, and sheets. The company specializes in machinery for packaging and processing.

Staying on top of technological innovations and constantly optimizing the company's technical equipment is a key aspect of Bandera's continuing global success in a competitive market. Bandera relies on Siemens technology for this vital part of the enterprise, as Virgilio Riva, electrical department manager, explains: "The Bandera and Siemens partnership is such a long-standing and highly successful one that you could say we have created a little Siemens world at our plant over the last 30 years. This gives us a competitive edge in very diverse markets all over the world and allows us to provide our customers with top-class products and services."

## Space-saving and versatile

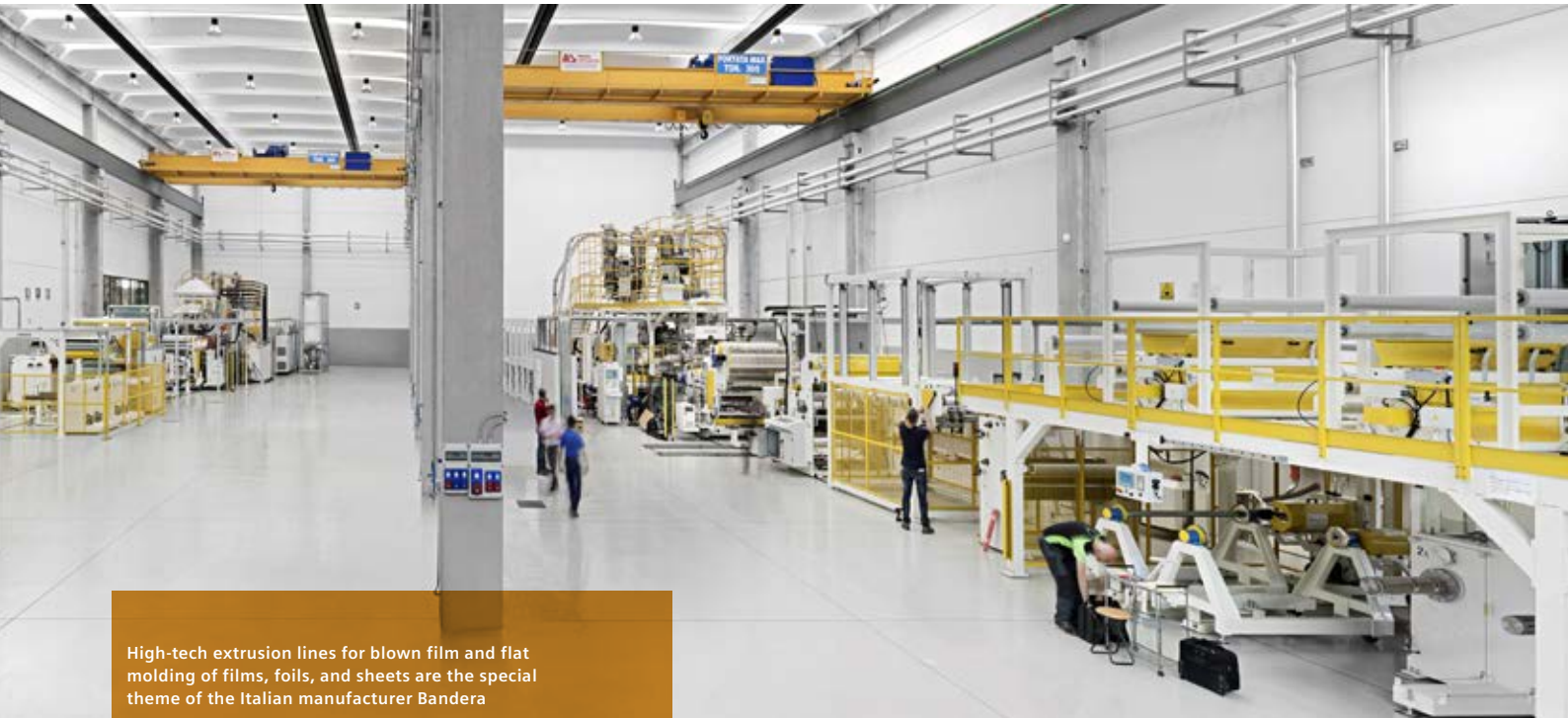
Bandera was very satisfied with the Siemens electro-mechanical equipment the company was already using, including inverters, panels and operator PCs,



and monitoring and programming software. When it became necessary to save space in the control cabinet in order to create more compact machines, Bandera decided to replace the standard motor starters with the new Sirius 3RM1 motor starters, for all applications. This decision was the result of an in-depth technical analysis completed by the Bandera electrical department in cooperation with the developers and machine operators.

The new Sirius hybrid starters are only 22.5 mm wide, and by occupying so little space they allow Bandera to realize extremely compact solutions. "We needed to reduce the number and size of the components in the control cabinet as much as possible," says Riva. "Considering that we have an average of five or six motor starters in each control cabinet, using a standard motor starter took up a lot of space. What is more, we also had to deal with the problem of using motors of different sizes that needed to be operated with different starters based on their power output."

This is where the new Sirius 3RM1 motor starters show their versatility. They are available in three broad current ranges (0.1–0.5 A, 0.4–2.0 A, and 1.6–7.0 A), which make it possible to start motors of different power ratings with only one device. This reduces the number of variables during set-up and simplifies commissioning. Considering the huge number of motors installed at Bandera, implementing Sirius 3RM1 motor starters offers significant advantages in terms of both the type of motor starters installed and the space required in the control cabinet. "With this new solution, we are able to use the same component on motors of different sizes simply by adjusting the



High-tech extrusion lines for blown film and flat molding of films, foils, and sheets are the special theme of the Italian manufacturer Bandera



Implementing Sirius 3RM1 motor starters offers significant advantages in terms of both the type of motor starters installed and the space required in the control cabinet

calibration," concludes Riva. All the functions are combined in one motor starter, eliminating the need for various devices such as contactors and overload relays. This reduces storage and commissioning costs.

### Short installation time

Mounting the new equipment proved to be very easy. Since all the functions were combined in one motor starter, there was no need for additional devices. The special infeed system available for Sirius 3RM1 motor starters minimized wiring and significantly reduced installation time. Bandera opted for Sirius 3RM1 motor starters with spring-loaded connections, which simplify wiring in the main circuit as

well as in the control circuit. If necessary, the connecting clamps can be removed from a given starter individually, enabling Bandera technicians to replace the starter easily. This further minimizes downtimes. Another key feature of the Sirius 3RM1 is the ability to use a fault diagnosis system. "Thanks to the LED status indicator on the housing of the Sirius 3RM1 motor starters, we see at a glance whether all the functions are in operation or if there are any problems," explains Riva. "This feature was really well received by our operators, since it makes their job a lot easier and enables them to quickly detect and correct any faults."

### Retrofit made easy

With the innovative Sirius devices, Bandera is able to replace extruders in an extrusion line that has been operating for many years. The company manufactures, commissions, and tests the new extruder before it is shipped to the end customer, and the machine is quickly integrated into the extrusion line on-site thanks to the simple and standardized switching technology. The choice of the Sirius 3RM1 for the extruders and auxiliary equipment has provided Bandera with benefits that translate into considerable cost savings throughout the project – from the number and size of the required components, to installation time, to operation and maintenance effort. ■

### INFO AND CONTACT

[siemens.com/motorstarter/3rm1](http://siemens.com/motorstarter/3rm1)  
[helene.steuer@siemens.com](mailto:helene.steuer@siemens.com)

## Global partner network

# Experts in demand

The Siemens Solution Partner Automation Drives have already established themselves as qualified and certified suppliers of solutions in the area of automation and drive solutions. The selected systems integrators offer custom-made, top-quality future-proof solutions that make a significant impact on their customers' long-term competitiveness. Now the group of Solution Partners, which comprises almost 1,400 members worldwide, also includes motion control specialists who, with their extensive expert knowledge, are competent suppliers of solutions for production and special-purpose industrial machines. And with the factory automation safety Solution Partners, experts are available who are well versed in the European standards for functional safety of automation solutions and in country-specific standards. They are also able to carry out risk analyses in order to enable conformity with EC guidelines and the CE labeling of machines and plants.

### Siemens Approved Partners expand the network

To optimally adapt its offering to its customers' needs, Siemens has developed a program for Siemens Approved Partners, who, in contrast to Solution Partners, deliver products, modifications, and comprehensive service. In addition to the high and reliable supply availability that they offer, they are characterized by their comprehensive knowledge of Siemens products, and they also offer special modifications and services. To optimally meet customer needs, Approved Partners have been recruited in various areas:

Approved Partners in the area of logistics offer customer proximity as well as guaranteed availability of a comprehensive range of contract products. Customers appreciate the efficient and straightforward order processes, together with the absolute delivery reliability and optimized logistics from

Quickly and reliably delivering a comprehensive product portfolio together with certified partners, offering special modifications, providing exceptional service, and implementing first-rate future-proof solutions – Siemens has made all this its goal with the Partner Program

one source. Tailor-made services such as just-in-time delivery round off the offering.

Value-added resellers are Approved Partners with detailed technical product



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The Partner Finder provides an overview of Siemens' Approved Partners and Solution Partners. It will quickly and reliably help you find the perfect partner for your specific task.

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

knowledge who offer their customers a combination of products and value-added services – from specific technology and customized modifications to the delivery of high-quality product and system packages. They support customers with qualified technical advice and support.

Approved Partners in the service area help ensure the availability of customers' plants around the world. Experts with specific know-how support customers individually. The performance range of the Service Partners comprises the specializations in repair, field service, enhanced services, and training. ■

### INFO AND CONTACT

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## Energy-saving door assembly with Profienergy

### Small effort – huge effect

The capabilities of Profienergy in industrial day-to-day operations were impressively demonstrated in Siemens' Future Forum at this year's Hannover Messe. At the fully automated door assembly display in the "Automotive Showcase," the energy consumption of the robots with and without Profienergy was measured over five days. The result: 85% less energy consumed using Profienergy during the nightly break.

The production line provided an outlook to smart production in the so-called Industrie 4.0 – a manufacturing process based on end-to-end digitalization and integration that solves problems autonomously and in which intelligent products hold all information ready on each individual stage of production.

During the trade fair, another completely different experiment was also performed on this forward-looking plant. Visitors were asked to estimate the energy balance when two robots are set to an energy-saving mode with

From a total of three KUKA assembly robots, two were equipped with Profienergy and achieved excellent results in energy consumption



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Profienergy when they are inactive, e.g. at nighttime, but the other robot is kept on. The results were much better than expected: The robots equipped with Profienergy only consumed 30 W at night, while the other, also inactive, colleague consumed nearly seven times as much energy. That means that energy savings of 85% were achieved with Profienergy!

With Profienergy, the already existing hard- and software can be simply integrated into energy management using

the Profienergy-enabled power module of the ET 200S and the function blocks in the controller. In conjunction with the Profinet function I-Device, Profienergy also enables to coordinately switch entire plant sections on and off. Since there is no manual, time-intensive switching to do, energy can be saved even during short interruptions.

[siemens.com/energy-efficient-production](http://siemens.com/energy-efficient-production)

## The Sinamics Perfect Harmony product line expands

### Greater versatility, easy integration

The Sinamics Perfect Harmony product line is now complemented by the addition of the Sinamics Perfect Harmony GH150. It provides even greater converter versatility, while providing users with the same benefits of motor friendliness and reliability they have come to expect with all of our Sinamics Perfect Harmony drives. It is

used primarily in the oil and gas, metal, mining, cement, and energy industries.

Just like in the Sinamics Perfect Harmony GH180, the Sinamics Perfect Harmony GH150 utilizes several low-voltage cells in series to produce a medium voltage at the output. This cell-based structure enables the converters to provide a wide voltage and power

range which can be accurately scaled to an application's requirements. Due to its modular design, failing cells in operation can be bridged or bypassed and the full output voltage retained via redundant cells. Thus, the new converter ensures a high level of availability for any application.

The Sinamics Perfect Harmony GH150 converters are especially designed for versatility and easy integration. Now it is possible to utilize standard transformers which can feature various cooling methods in combination with a cell-based converter. Choosing the appropriate transformer saves investment costs and minimizes operating costs. Since the control cabinet can be separated from the power unit, the footprint requirements of the converter can be adjusted and optimized to the plant conditions. The control cabinet can even be installed, for a simpler and more secure operation of the converter, in a separate room.

[siemens.com/sinamics-gh150](http://siemens.com/sinamics-gh150)



The Sinamics Perfect Harmony GH150 converter can be accurately scaled due to its cell-based structure

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## Sitop UPS1600 starter package

### First open and system-integrated DC UPS

The first and currently the only fully automation-system-integrated DC UPS is now available as a starter package with a very attractive price. In addition to a DC UPS module, the package also includes the appropriate battery module and comprehensive software as well as complete documentation for easy start-up. The package includes a ready-to-use Industrial Ethernet connection cable for quick integration into the automation system. Users can plan, configure, and monitor the Sitop UPS1600 DC UPS quickly, easily, and in a fail-safe manner via TIA Portal. Thanks to its two Industrial Ethernet/Profinet interfaces, the innovative Sitop UPS1600 can also be linked with automation computers.



For PC-based applications, the Sitop UPS Manager software, which is a part of the starter package, can be used to configure and monitor the DC UPS. The following components are included in the starter package:

- Sitop UPS1600 24-V/10-A DC UPS module with Industrial Ethernet / Profinet interface (item no. 6EP4 134-3AB00-2AY0)
- Sitop UPS1100 24-V/3.2-Ah battery module (item no. 6EP4 133-0GB00-0AY0)
- Industrial Ethernet connection cable with 2 x IE FC RJ45 Plug 180, 2 m long (item no. 6XV1871-5BH20)
- CD with documentation for Sitop UPS1600 and software tools:
  - Sitop UPS Manager for configuration and monitoring of PC-based systems
  - Function modules, faceplates, GSD, and HSP for Simatic S7, WinCC, and TIA Portal

The package can be ordered at your local Siemens branch or directly through the Siemens Industry Mall at [siemens.com/industrymall](http://siemens.com/industrymall). Item number: 6EP4134-3AB00-2AP0

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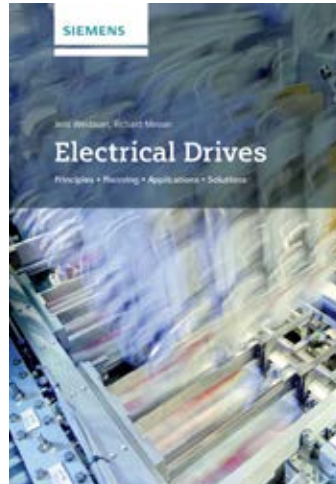
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2014, 397 pages,  
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A large background image showing two men in a professional setting. The man on the left, wearing a white shirt, is smiling and pointing at a Siemens control panel with a screen and various buttons. The man on the right, wearing a green sweater and glasses, is also smiling and looking at a tablet computer held by the first man. The background is slightly blurred, showing what appears to be a laboratory or training center.

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