



Focus on Glass and Solar Industry

The Magazine for the Glass and Solar Industry

2012

SIEMENS

Trends in the Glass and Solar Industry

New Perspectives with Renewable Energies

Plant-wide Automation

Taking a long
View with
Totally Integrated
Automation

**Sustainability and
Energy Efficiency**

Solutions
for the entire
Lifecycle
of a Plant



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“Energy-efficient production and quality need not be in conflict.”



Bernhard Saftig

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In view of growing global energy demand and increasingly scarce resources, an energy revolution is under way, pursuing maximum efficiency, uncompromising resource conservation, and green renewable energy. This revolution will shape the future and bring challenges as well as completely new opportunities to companies in the solar and glass industry. These opportunities could relate to the expansion and further development of photovoltaics, insulation of buildings, or glass-fiber-reinforced vehicles that are thus lighter and create fewer emissions.

In the process, the glass and solar industries are unmistakably growing together. Glass is a key product for solar energy, as glass components are part of every solar module. Hence, the glass industry will profit from the demand for solar installations in the course of the energy revolution.

In order to design energy-efficient and sustainable production processes for advanced products and components, innovative technologies and strong partners are needed. These partners must know the requirements of both industries and be able to take advantage of the synergies – like Siemens can. We offer a comprehensive, standardized portfolio for glass and solar production plants, with energy-efficient products, solutions, and services. We also provide support for planning, implementation, and plant upgrades.

In this first issue of our magazine for the glass and solar industry, you will learn more about topics such as opportunities for plant-wide automation based on Totally Integrated Automation (pages 8 and 9). And you will gain insight into a wide range of applications showing that energy-efficient production and high-quality products need not be at odds with each other.

We hope you enjoy reading Focus on Glass and Solar Industry and that you gain valuable ideas for your work.

Bernhard Saftig

- A complete Range for the Glass and Solar Industry

The Way is clear for the Energy Revolution

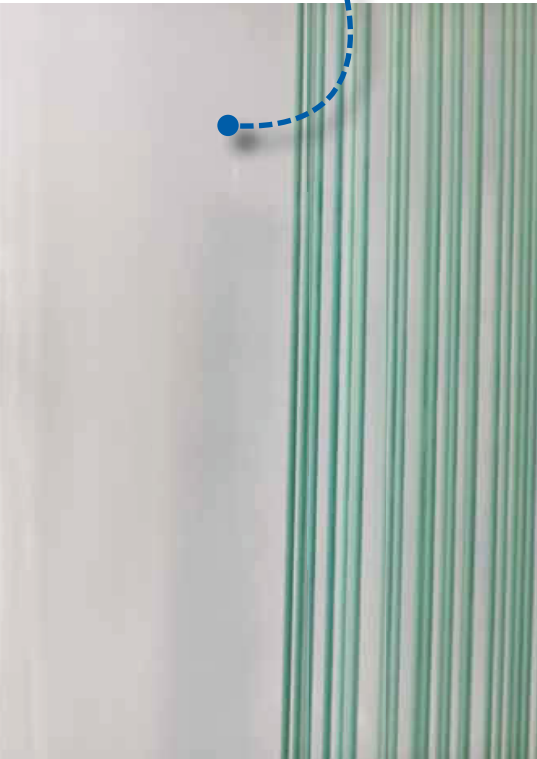


Fotolia / DeVice

Solutions for the
entire value chain:
from silica sand
as a raw material ...



... to highly
transparent
solar glass



W. Geyer

The energy revolution has begun – in more ways than one. In addition to the issue of renewable energy, the focus of the glass and solar industry is also on energy-efficient and sustainable production processes. Siemens offers products, solutions, and services for enabling energy-efficient processes that are also profitable – all along the value chain and across the entire lifecycle of production plants.

The supply of power will radically change in the future – away from fossil and nuclear sources and toward renewable energy. There will also be a revolution in the glass and solar industry with regard to production processes. But in both cases, the long-term goals are the same: energy efficiency, resource conservation, and sustainability. These goals can only be achieved through the use of modern technologies – which in turn create new possibilities for optimization so that productivity and energy efficiency can be increased.

The energy revolution is irreversible.

**For the glass and solar industry,
this revolution represents a great
opportunity.**

On the one hand, the energy revolution is an enormous opportunity for the glass and solar industry; on the other hand, it also means that those responsible are faced with enormous challenges. To be able to implement more efficient production processes, the glass and solar industry cannot just look for isolated solutions. An increase in both productivity and efficiency can only be realized if the entire production process is addressed. ►



Fotolia/M. Rogner

... to coated
performance glass



W. Geyer

... to pure silicon

The desire for increased efficiency in production presents the glass and solar industry with great but not insurmountable challenges.

- One of the challenges initially results from the demand for energy-efficient production processes. In this regard, a rethinking has already come about in recent years, in the energy-intensive glass industry

in particular. Simatic PCS 7 is an example of a technology that makes a major contribution to the design of more sustainable production processes. The process control system prevents fluctuations in the melting process that otherwise lead to energy losses. Another opportunity for energy savings lies in the optimization of speed-controlled motors. This is already a reality in both industries, thanks to regenerative Sinamics frequency converters. The concept of waste heat and residual heat utilization expands the repertoire of opportunities: unused heat that is unavoidably created during the melting processes is converted into new energy using steam turbines. Modern energy management systems also make an important contribution to energy-efficient production processes. Siemens has developed an energy optimization concept that examines all the processes within a plant and analyzes them with regard to energy-saving potential.


...to the finished photovoltaic modules



...and from silicon production ...




W. Geyer



In any effort to increase sustainability and energy efficiency, neither productivity nor quality should suffer – quite the opposite should be the case. Increased sustainability and efficiency can only be achieved through the use of reliable and modern technology.

Siemens will remain a reliable industry partner in the future, supporting the energy revolution within the glass and solar industry.



With regard to the energy revolution in the glass and solar industry, Siemens offers the sector a number of solutions that can reduce lifecycle costs while simultaneously increasing efficiency. Plant-wide automation is a textbook example of such an approach for the glass industry (see also pages 8–9). The focus is on simple integration of all subplants and systems in a uniform, common infrastructure. Plant-wide automation is based on the open system Totally Integrated Automation (TIA), which is continuously being further developed. The central data storage makes it easier to analyze and optimize processes; at the same time, it supports effective lifecycle management and thus creates the basis for the comparison of plant performance and efficiency even over long periods of time and between production sites. This allows plant operators to optimize the efficiency of their processes in a sustainable way – in harmony with the desire for sustainable energy management. The central engineering and standardized reporting also support efficient operation. Plant operators can see at a glance what quantities of energy and raw materials are being used as well as where they are being used in order to draw conclusions about efficient plant operation. These data also provide important information about

the state of the plant in sensitive areas of glass production, such as in the melting furnace or, for silicon manufacturing, in the chemical vapor deposition (CVD) reactor. This allows repairs and maintenance to be adapted to actual requirements. Thanks to Totally Integrated Automation, this data transparency is now much easier to achieve – and can be implemented across the entire production process. This in turn means that glass and solar producers profit from higher efficiency and much lower operating costs during the entire service life of their plants, and this extends to all areas of production.

More examples from the area of digital engineering (see also pages 28–29) show that the foundation for a highly efficient factory should already be laid at the planning stage in the model, as crucial errors can be remedied early without the costly investment of capital, resulting in energy- and process-optimized production lines.

These examples show that decision makers in the glass and solar industries can benefit from innovative, reliable solutions for the planning and implementation of energy-efficient production processes. This is the basis for strategies that improve productivity and energy efficiency in such a way that they go hand in hand rather than canceling each other out. But to make this possible, the optimization measures need to be implemented not just on an isolated basis but in all areas of the production process along the entire value chain and including all supply systems and utilities. In the future, highly efficient products from the glass and solar industries will form the basis of the energy revolution – for example, glass will be used as a construction material to boost energy efficiency, while solar power will be used to substantially increase the renewable share of the power mix. Thus, the energy revolution is ready to start. ■

info

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■ Plant-wide Automation

Taking a long View with Totally Integrated Automation

To be able to optimize production processes, you need to know them very well. With plant-wide automation – based on Totally Integrated Automation (TIA) –, glass producers can more easily make the required data transparency a reality and benefit from higher efficiency over the entire life of the plant.

Glass producers have long attempted to integrate all the plants of a production line into a common information system in order to draw conclusions from these data about the current situation of the entire plant. Until now, there have been no easy solutions to accomplish this. For example, every supplier has its own operating philosophy, and the corresponding diversity of user interfaces even for tasks that are in part identical means that the costs for training, engineering, commissioning, and maintenance are higher. In addition to the same look and feel of all screens, uniform operation and monitoring of the process means that all information from the system components can be stored in a uniform database – for further editing and processing for plant-wide process control, process optimization, energy management, or service, or as an interface to the manufacturing execution system (MES). For the construction of new plants, the factory planners need to define the specifications for plant-wide automation and communicate this information to the plant and machine builders as guidelines for the design of the machine automation. In addition to the specifications of the hardware and software for automation, interfaces must also be well defined so that everything will mesh seamlessly during the integration and commissioning of the plant.

Simple integration

Plant-wide automation pursues this approach – and has been very well received in the glass industry. “Plant-wide automation provides optimal support



Plant-wide automation at f | glass: the operator has an overview of all information regarding energy and materials consumption, making it easier to plan maintenance work

for factory planners, machine builders, and operators of glass plants,” says Wolfgang Rübiger, CTO of f | glass GmbH. “For the first time, our requirements for standardization and simple integration are being taken into account and implemented.” The centralized engineering and the standardized reporting support efficient operation, according to Rübiger: “We know at a glance how much energy and raw materials we are consuming and where, and thanks to this information in critical production areas, we can adjust maintenance measures to the actual requirements.”

»Plant-wide automation provides optimal support for us as operators of glass plants.«

Wolfgang Rübiger, CTO, f | glass GmbH



Siemens AG/ W. Geyer

With plant-wide automation, the integration of individual OEM automation solutions is technically simple, fast, and easy. In the process, these automation solutions remain the responsibility of the OEMs, while Siemens takes over their integration into an automation system for the entire plant. Via remote access all OEMs can maintain, test, and change their applications separately, independently, and in a manner that protects their expertise. With standardized tools and individual coaching, Siemens provides advice and support to them in creating the optimal conditions for the integration of their system components.

Advantages in engineering, operation, and modernization

The heart of plant-wide automation is the Simatic PCS 7 process control system. All the plant's data and documents are organized in a centralized engineering database. The OEMs also use the centralized engineering of Totally Integrated Automation for diagnostics, software upgrades, configuration and calibration of field devices, and factory acceptance tests (FATs). For this, Siemens provides an interface and secure remote access.

The plant operator has access to the entire plant from all operating stations, and individual access rights can be defined. The system logs what changes were made, who made them, and when they were made. An optional asset management system that provides maintenance information can be helpful. The central data storage and uniform access keep all options open – for subsequent optimizations of the process and energy management, for example.

OEMs benefit through increased sales

The OEMs also benefit: "The concept supports us in the acquisition of orders," explains Dr. Holger Zippe,

CEO of Zippe Industrieanlagen GmbH, a global leader in the development of batch plants and plants for preparing glass and shards for the international glass industry. "Our plants are ultimately sold on the basis of the added value they bring to the operator." The initial increased expense for plant-wide automation solutions pays off. "Plant-wide automation offers many advantages," confirms Karl-Heinz Bertram, CEO of Bertram Elektrotechnik GmbH, "especially in the context of international markets. The concept enables operators to set up safe and standardized access, which we specifically use to access our applications for remote maintenance. The operator benefits from the increased security, and we benefit from the reliable, protected remote service access, which ensures the performance of our systems at a reasonable price."

Plant-wide automation is an investment in efficiency technology whose positive impacts quickly begin to pay off. A holistic approach is becoming more and more important in this context. This includes targeted investments in efficiency measures, first and foremost in better machines and optimized production processes. For many companies in the energy-intensive process industry in particular, the potential for energy savings would exceed the required investment costs four times over by 2050. The concept has already been successfully implemented in many countries within the scope of projects with internationally known OEMs. ■

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■ Ducatt, Belgium

Solar Glass for the Future

Glass rolling line as part of the
new solar glass production plant

Belgian solar glass manufacturer Ducatt completely overhauled its production facilities and is now using the Simatic PCS 7 process control system for plant-wide automation. The integrated control system is used for all areas of the new production plant.

The name Ducatt stands for “dedicated ultra-clear antireflective thin and toughened” solar glass. The Belgian company is a spin-off business of market leader Emgo, which has more than 45 years of experience in the manufacture of high-quality drawn and blown glass. Emgo develops and produces glass for lamps and also develops specialized applications such as pressure-resistant

vacuum tube collectors for solar plants. Through the development of such tube collectors and tube products for thermal systems, Emgo has been able to establish itself in the solar industry in recent years. And solar glass is now Ducatt’s field of expertise – with a highly motivated team of experienced employees, from well-trained and experienced machine operators to specialized glass engineers.

Totally Integrated Automation

The Ducatt production plant was completely modernized, and a new melting furnace for solar glass, as well as the corresponding state-of-the-art production line, was added to the facility. Siemens Brussels successfully implemented machines from German, French, and English manufacturers together with system components from Ducatt into the new production plant. In the process, existing plant sections were maintained. For automation in the new rolled glass plant, the Simatic PCS 7 process control system is used. The new process control system consists of four nonredundant automation systems, two redundant servers, a central engineering system, and three clients. There is also an interface to a variety of non-Simatic controllers that are responsible for tracking the process and for archiving important production data.

An advantage of plant-wide automation using Simatic PCS 7 is that all engineering information is brought together in a central database, enabling effective maintenance on-site. The operator also has access to the entire plant – and this access is available from every operator terminal. The system administrator determines the rights of the various users and which plant areas can be accessed. In order to update the automation structure when required, Siemens offers services over the entire lifecycle of the plant. All involved OEMs also have the option of remote access, allowing them to maintain associated applications and rectify errors from faraway locations. The security of the data transmission is ensured in the process.

Everyone is more than satisfied with the results. The new process control system features a uniform look and feel that makes work easier for both the operators and the maintenance personnel. It also operates all the sections of production – and is nevertheless controlled from just one central engineering system.

Modern production lines for glass processing

Ducatt uses quartz sand from one of the best low-iron sandpits in Europe. Production lines of the company's strategic partner LiSEC are used for cutting, edge smoothing, and hardening the glass. In addition, Ducatt develops antireflective coatings that achieve the highest possible transparency and light permeability in the entire photovoltaic spectrum. All Ducatt production lines now produce highly transparent solar glass that features consistent quality and high adaptability, with processing and delivery times minimized. A continuous and linear production monitoring system checks and tracks each individual sheet of glass – starting from its base material and continuing on through to delivery to the customer. The process of creating each sheet is thus completely documented and traceable.

Tailored and future-oriented solutions

Highly transparent solar glass is used in a large number of variants. In the beginning, Ducatt concentrated on the fast-growing market of crystalline silicon (c-Si) modules for photovoltaic systems. The solar glass manufacturer will continue to supply to these customers, but the company is now considering future development of tailored solutions for photovoltaic thin-film modules, thermal solar flat collectors, concentrated solar power (CSP) systems, and even greenhouses. The current company location offers enough room for Ducatt to continue to grow over the long term together with the solar energy market. ■

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www.ducatt.com

■ Sangalli Vetro S.p.A., Italy

Integration Produces Efficiency

The Sangalli Group has built one of the world's most modern plants for the manufacture of float glass with Totally Integrated Automation based on Simatic PCS 7.

Planning the new plant for manufacturing float glass presented both a challenge and a unique opportunity. In addition to the critical aspects of the production process, the complex operational requirements of a very competitive market environment needed to be taken into account. In order to make the project a success, seamless collaboration between the planners, suppliers, installers, and plant managers was required. This was accomplished in San Giorgio di Nogaro, a town in north-eastern Italy where the Sangalli Group built its second production plant for float glass – one of the most modern in the world.

Planned productivity

"We designed both the furnace and the entire process control system of the plant in such a way that we would be able to achieve maximum productivity and efficiency over the long term," explains Riccardo Facca, technical director of the Sangalli Group. All aspects relevant to operations were already included in the earliest project phases – from energy consumption and maintenance to the productivity of all the individual components and possible expansions during the lifecycle of the plant. "The automation solution based on plant-wide automation fits in very well with our vision," says Facca, "and today influences all our planning related to the control system of the plant."

The float glass line has an annual production capacity of approximately 220,000 tons of clear and extra-clear float glass. The capacity of the furnace is 700 tons per day. The products made in San Giorgio di Nogaro

The glass sheet is stress-free after cooling



are not just for the northern Italian market but also for the similarly important markets of the neighboring states of Austria and Slovenia as well as for the Balkan countries and Eastern Europe.

For the plant's process control system, Sangalli chose Simatic PCS 7. All automation and operational sequences were planned and implemented using an integrated approach. "The designers of the individual subsections and machines were also charged with adjusting their systems in order to allow us to integrate them easily into Simatic PCS 7 and create a plant-wide automation solution. To accomplish this, the suppliers needed to provide the appropriate product information and data for the control system

in the correct format via an interface. Siemens provided support to the project partners in checking the solutions and ensuring conformity with the specified architecture, allowing the project costs to remain safely within the planned budget," explains Facca. "For the coordination of such an extensive and complex project, we were very glad that Siemens was able to offer us this support."

New opportunities in a competitive market

The plant in San Giorgio di Nogaro was opened in June 2011. The new plant allows Sangalli to reach its planned production quantities and further secure its leading position in the market. "The excellent results from the plant show that we made the right planning and operational decisions," concludes Sangalli Group CEO Francesco Sangalli.

A further result of the project is that Sangalli will now be present in the market as a supplier of furnaces for the manufacture of flat glass with a capacity of 500 to 800 tons per day. "Now we can demonstrate to our potential customers in a very specific manner how they can increase their production efficiency and strengthen their competitive position by connecting a high-quality furnace with a state-of-the-art control system," emphasizes the chief executive.

Greater transparency, better performance

Thanks to the plant-wide automation concept, Sangalli will be provided with a great quantity of information from the ongoing process; this information can then be used to continuously improve the performance of the plant. Since the manufacture of float glass is very energy intensive, the focus is naturally on the optimization of consumption. For example, Sinamics converters, highly efficient Simotics motors, and Simocode motor management systems were used; sensors and measuring devices of the Sentron PAC3200 type were also installed in every subsection for monitoring processes and energy flows.

"In the meantime, we have amassed a great deal of reliable data on energy consumption and energy flows of the running plant," reports Facca. "This allows us to determine further areas with potential for improvement on the basis of our own experience." Thanks to the integrated automation, Sangalli can also improve the further training of the company's technical personnel as well as optimize costs for spare parts warehousing. "We receive current and credible information that allows us to increase efficiency and quality while reducing production costs," says Facca. ■

»We receive current and credible information that allows us to increase efficiency and quality while reducing production costs.«

Riccardo Facca, Technical Director, Sangalli Group

All process steps can be monitored from the control center

The glass is melted in the furnace at a temperature of 1,600°C

All photos: Sangalli Group

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Sibelco extracts quartz sand in a very eco-friendly manner in the region of Maasmechelen and Dessel-Mol-Lommel



■ Sibelco, Belgium

Respect for Nature

Extracting silica sand from its natural deposits is a resource- and energy-intensive process. However, the Belgian company Sibelco proves that it can be done with respect for nature. The detailed and reliable measurements provided by a comprehensive Siemens process instrumentation installation help the company optimize its processes for maximum eco-friendliness.

Sibelco extracts and refines various types of sand and minerals. The area around Maasmechelen and the region of Dessel-Mol-Lommel are very rich in quartz sand and form the basis of the company's quartz operations in Belgium.

Silica sand is a valuable raw material that is essential for the production of many everyday goods. In every car, for example, approximately 50 kg of silica sand are used. Pure silica sand also forms the basis for the production of many other kinds of glass. The extraction of minerals inevitably modifies the landscape, but Sibelco aims to minimize the impact of its operations on the environment. Respect for the environment, which includes the

responsible use of both land and water as well as efforts to improve energy efficiency, forms an essential part of Sibelco's long-term vision.

Modern technology

To improve process performance in this respect, the plant operator needs reliable information on the process conditions. Consequently, after an extensive comparison of available suppliers, Sibelco opted for Siemens as the provider of a comprehensive process instrumentation solution. Devices from the broad range of Siemens products met the specific requirements of Sibelco: resistance to the abrasive process, outdoor mounting capability under all weather conditions, Profibus communication, and extensive diagnostics capabilities.

Precise monitoring and control of flow rates is essential for optimizing both process efficiency and resource consumption, especially water. At several locations in the process, Sibelco has installed precise Sitrans F flowmeters. In the dredger, where the sand is extracted from the deposits, a Sitrans FM magnetic-inductive flowmeter measures the flow rate of the sand/water mixture. This measured value is used to control energy consumption in the dredger unit. The flow rates of the extra-process water are monitored by a Sitrans FUS1010 clamp-on meter that was easily fastened onto the water pipeline. Additional Sitrans flowmeters are installed in the hydroclassification and water treatment units. In the hydroclassifier, the parameters of the Sitrans measuring devices are also directly fed into the inflow and outflow control performed by Sipart PS2 positioners that open and close the valves for the water and sand inlets and the sand outlet.

Monitoring the filling level and process pressure throughout the process makes an essential contribution to process performance and safety. Various Sitrans devices provide information on filling levels: Sitrans LU ultrasonic devices monitor the layer thickness for optimum performance in the sand drying unit and measure the filling level in the water treatment unit. Additionally, Pointek level switches prevent spills and choking in critical process areas, helping improve process availability and safety. Sitrans LR radar measuring systems are installed on the roofs of the storage silos for wet sand and dry sand to monitor the filling levels. The level monitoring systems are complemented by Sitrans P pressure transmitters that are used to calculate the density

of stored media or to optimize process performance in plant sections such as the deduster.

Mass flow of both wet and dry sand is measured by Milltronics MSI belt weighing systems, and a Siwarex WL load cell monitors the net weight in the quartz powder silos.

Process instrumentation met all of Sibelco's requirements

During the project, Sibelco greatly benefitted from the presales services and consulting offered by Siemens, which helped the company choose the right systems and configurations for its specific application and requirements. The Siemens team was able to deliver perfect solutions even for more challenging tasks. One example is the Sitrans LR560 radar devices, which provide reliable noncontacting measurement of quartz sand levels. Contacting level-monitoring methods can fail due to cable breaks, and other noncontacting methods would have suffered from indirect reflection, making the results unstable. Consequently, the radar devices were a perfect match.

The plant operators can now make use of reliable and precise information from the process level – and can control the process to achieve optimum efficiency and performance. ■

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Mass flow of both wet and dry sand is measured by a Milltronics MSI belt weighing system



Pointek level switches prevent spills and choking in critical process areas

■ HORN Glass Industries AG, Germany

Energy-Optimized Glass-Melting Technology

HORN Glass Industries has made a name for itself in the area of glass-melting technology. The company supplied a completely new plant for Vetropack Moravia, among other customers. The PCS 7 process control system was used there for plant control.

HORN Glass Industries AG, which has its headquarter in the Bavarian town of Plöbberg in Germany, develops state-of-the-art system solutions for the glass industry. With more than 125 years of experience in this area, HORN Glass Industries is regarded as an expert partner for glass product manufacturers worldwide. The Bavarian company offers everything from a single source. Depending on the application area and required performance, a wide range of glass-melting furnaces, for example, are planned in Plöbberg and then constructed on-site for customers. From small furnaces for specialized glass to energy-saving, regeneratively heated furnaces for container glass and large float glass furnaces – all are part of the product line of HORN Glass Industries AG. HORN's range of offerings is rounded out with customer-oriented services and specific plant components such as heaters and electrical control systems.

Competence and reliability for glass plant construction

The company's global success in glass plant construction is based not only on its experts' many years of experience but also on the reliability of the technical components used. Both aspects – expertise and reliability – are highly appreciated by the company's customers and have provided HORN with many repeat orders.

Vetropack Holding S.A., an internationally operating Swiss packaging glass manufacturer, has chosen HORN plants multiple times. In the case of the Czech subsidiary Vetropack Moravia, the order placed with HORN Glass Industries included the planning of the entire glass plant with a melting capacity of 350 tons per day. The existing recuperative furnace was to be replaced by new, energy-saving technology. For this reason, a regeneratively heated glass-melting furnace with improved thermal insulation on the vault was used. The energy consumption in



Visualization with PCS 7 enables simple and unrestricted control and operation of the plant



For Vetropack Moravia, HORN Glass Industries planned the entire glass plant with a melting capacity of 350 tons per day

green-glass production was thus reduced from the previous 1,200 calories per kilogram of glass to approximately 880 calories. The heating of the glass plant was implemented using gas burners of the newest generation as well as by melting, barrier, and refinement boosting. A boosting system was also installed in the flow.

Energy optimization in the doghouse area

As with the previous projects for Vetropack, the Simatic PCS 7 process control system was used for control and regulation of the plant. A redundant CPU AS417-4H was used in the control cabinets, and ET 200M modules with Simatic S7-300 CPUs were used in the distributed controllers. A noteworthy feature of the project is the redundant design of the power supply as well as of the software and hardware components. The redundant components synchronize with each other every 200 milliseconds and can completely replace their partner units in case of failure.

After the commissioning of the glass-melting furnace, energy optimization was carried out in the area of the doghouse. For this, HORN Glass Industries supplied a new insertion machine. This made it possible to better seal the doghouse, thus substantially reducing energy losses.

Possibility of visualization enhances automation

In addition to the use of the right technology, visualization now also plays a major role in automation. It provides the customer with unrestricted and greatly simplified control and operation of the plant. The archive functions integrated into WinCC and PCS 7

allow plant data to be easily exchanged electronically between HORN Glass Industries and the customer. This enables remote maintenance of the plant through the use of the PCS 7 Web Navigator, which allows the plant to be operated and monitored using a standard Internet browser. This ensures that help is never far away in the event of a breakdown or production problem.

Geared for the future thanks to great flexibility

The Simatic PCS 7 process control system has taken on an essential role in plant control – which is demonstrated both by the experiences of HORN Glass Industries and by the positive feedback from customers. The uncomplicated interaction between PCS 7, field devices, and bus connections to decentralized controllers or monitoring workstations impressed the decision makers at HORN. The company's customers first and foremost appreciate the reliability of the technology in use as well as the plants' high degree of flexibility. Both traits have ensured orders for HORN Glass Industries in the past.

Making use of Siemens products, the company has now developed a user-oriented control system to reduce energy consumption. At the same time, this system also helps reduce harmful emissions and enable longer service lives for the furnaces. ■

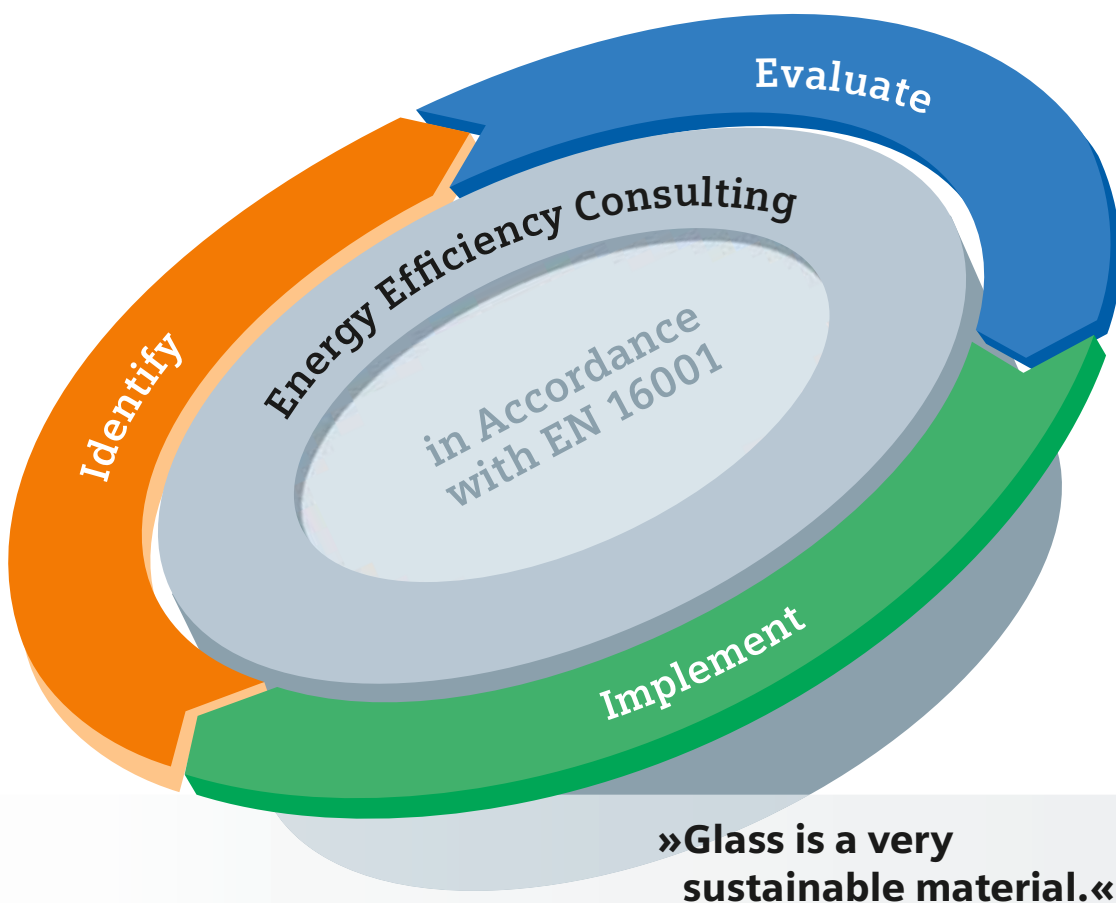
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■ Energy Efficiency in the Glass Industry

Economically Sound

A great deal of change is occurring in the glass industry: innovative concepts are ensuring active environmental protection, but they are also enabling energy-efficient production as well as providing significant savings for manufacturers.



Dr. Muncke, the manufacture of glass containers requires high energy inputs, mainly in the form of heat from fossil fuels. One of the challenges for the future is increasing efficiency and making good use of surplus heat. What other issues play a role, from your point of view?

Dr. Jane Muncke: From my point of view, other important issues are seriously neglected in the sustainability discussion. Glass is a very sustainable material. For example, recyclability is just as important; glass containers can be endlessly recycled. In Switzerland, 96 percent of glass containers are currently recycled. That's a level that other European countries are still looking to reach.

Glass is among the oldest materials in use by humankind. It is perhaps for this reason that innovations are adopted at a rather slow pace in the glass industry. But in order to conserve resources and maintain the environment for generations to come, the glass industry has seen itself compelled to think about energy efficiency. And the key to achieving this lies in innovations. New technologies enable energy-saving and environmentally friendly production with the goal of sustainability.

Saving energy through the use of modern technology

There are many ways to save energy in the glass industry – one of which lies in the use of the Simatic PCS 7 process control system. For example, fluctuations in the melting process, which can lead to large losses of energy, can be avoided through the use of PCS 7. Energy recovery represents another means of energy optimization. Sinamics frequency converters capable of energy recovery feed the recovered energy back into the grid, making it available again.

Energy efficiency thanks to waste heat recovery

One problem for glass manufacturers has been the huge amount of unused heat created inevitably during the melting processes. In order to recover this energy, Siemens developed compact steam turbines to help convert the waste heat from the melting furnace for glass production into new energy. Up to 40 percent of the energy can be recovered in this way and then put to good use. In-house generation of electrical energy through waste heat utilization has

enormous advantages: In addition to the significant electricity cost savings, it leads to greater independence from rising energy prices. And this innovative use of waste heat also contributes to active environmental protection, of course – because the glass manufacturer itself can produce up to 100 percent of its required electrical power through industrial waste heat utilization alone.

Modern energy management systems contribute to optimization

The use of sophisticated state-of-the-art technology represents an important path to the optimization of energy consumption, but it is not the only approach. In order to improve the energy balance of a glass manufacturer over the long term, all work processes within the plant must be addressed. To this end, Siemens developed an energy optimization concept that views the processes within the plant holistically and assesses them in terms of possible savings potential. Energy management systems such as B.Data create the required transparency, thus enabling efficient and targeted energy management.

By relying on an expert and reliable partner like Siemens, manufacturers in the glass industry can benefit from an energy-efficient production process without having to neglect their core business to do so. This is because Siemens has both the required experience and the necessary expert and partner contacts to ensure energy optimization in the glass industry. ■

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As an environmental scientist you are concerned with topics such as glass as an exemplary packaging material. Why is glass considered to be the better alternative when it comes to food packaging?

Dr. Jane Muncke: Food packaging is often the greatest source of chemical food contamination. Synthetic, hormonally active substances are of particular concern. Such substances are currently still permitted for food packaging. But with glass bottles, migration from synthetic chemicals is not an issue, since they are manufactured from natural substances.

What are the sustainability aspects of glass?

Dr. Jane Muncke: In a future concerned with health and a clean environment, glass will be the material of choice – because glass distinguishes itself in many regards through its sustainability. It does so not just with regard to the



**Dr. Jane Muncke,
Environmental
Risk Assessment
Specialist**

environment but also in relation to personal health. For example, glass as a food packaging material can tap a niche market among consumers who value uncontaminated food that is regionally produced, transported, and consumed. And such products are in turn in harmony with the concept of sustainable development.

Despite the careful handling of the PV cells, a TS1200 Gold Combined Tagger and Stringer achieves a throughput of up to 1,200 cells per hour

■ P.Energy, Italy

Renewable Energy

Modern control, drive, and engineering solutions make it possible for a leading Italian manufacturer of machines for the production of photovoltaic modules to maintain high quality standards.

The product portfolio of P.Energy, founded in 2002, ranges from special machines to complete product lines for photovoltaic modules. Research and development plays a major role in the company's operations. P.Energy also supplies leading companies with laboratory machines, and it is in this context that an automation platform is important in order for the company to be able to quickly respond to customer requirements. From the very beginning, P.Energy relied on Siemens. The members of the automation team were particularly impressed by the large selection of expandable and compatible products, as well as by the brand's worldwide reputation for quality.

Machine for recyclable photovoltaic modules

Recently, P.Energy created a compact machine for the production of photovoltaic modules that are up to 100 percent recyclable. Their manufacture is based on thin-film technology, with the cells vacuummetallized and sealed onto a stainless steel plate. The machine, which was developed in collaboration with the Swedish company MidSummer AB, is used for pretreatment of the cells on the steel plate. Control is provided by a Simatic S7-1200 controller with a CPU 1214, enhanced with a CP 1243-5 Profibus DP communication module as a master for the Profibus network of the machine. Intelligent drives control stepper motors that ensure position control in every operating situation.

"The Simatic S7-1200 is inexpensive and sufficiently powerful for these tasks," emphasizes Manuele

Ferraro, chief technology officer of P.Energy. The integrated Industrial Ethernet interface is used for connecting the visualization systems and for remote maintenance of the machine. Thanks to the integrated PID (proportional-integral-derivative) controller, the temperature can be regulated directly through the control system without it being necessary to fall back on external hardware. Engineering using TIA Portal with Step 7 Basic V11 and WinCC Basic V11 software has proven itself. The software modules and programs developed in this way can be used and reused in a flexible manner.

Gentle positioning of the cells

With regard to the automation, it is the downstream stringer in particular that is very complex; it removes the cells from the carrier, places them in a row, and solders them so that they are wired in series. Automation challenges include the very high cycle rate and the extremely fragile nature of the material being moved. To drive the 14 machine axes, P.Energy uses Simotics S-1FK7 brushless motors. The Simotion motion control system allows precise positioning of the cell and rapid but gentle control of the acceleration and delay ramps. The machine's head control is a Simatic S7-315, which controls and diagnoses the entire process autonomously. ■

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■ UAS Messtechnik GmbH, Germany

A One-Stop Shop for Expertise

State-of-the-art technology, the highest quality standards, and efficient energy management – with this strategy, UAS Messtechnik has found success throughout the world, including on the Chinese island of Hainan.



Firing systems of a float glass plant

All pictures: UAS Messtechnik GmbH



Thomas Donaubaier,
Managing Partner,
UAS Messtechnik GmbH:
»The ability to provide every-
thing from a single source is –
for us and especially for our
customers – an important quality
improvement that considerably
sharpens our competitive edge
as we expand our international
business as well.«



UAS Messtechnik GmbH, based in Viechtach, Germany, is among the top suppliers and partners in the international glass industry.

The company's services range from design and implementation of complete plant control systems to future-oriented technologies for energy efficiency and environmental protection. "Since 2006 we have been working successfully with Siemens and are today certified as a Siemens Glass & Solar Industry Partner; recently we have also been working increasingly with Siemens in the solar industry, such as on polysilicon. Both sides benefit from the combination of excellent process knowledge, state-of-the-art technologies, and global distribution networks," explains Thomas Donaubaier, managing partner of UAS Messtechnik GmbH. The engineers from UAS have now completed their first joint international project: in China, together with Siemens and other partners, they have created one of the world's most modern float glass plants.

Standardized and state of the art

The new production line is used to manufacture high-strength aviation glass, which needs to meet the highest quality standards. Energy efficiency was also an important criterion. For the new production

line, Siemens and UAS Messtechnik used the Simatic PCS 7 process control system in its standard configuration and added new features. For example, the furnace control was equipped with the newest Advanced Process Library (APL) and new control concepts for the float bath area. For the firing, UAS Messtechnik provided TÜV-certified oxy-fuel systems with Simatic S7 controllers. Compared to conventionally fired furnaces, such systems provide better quality, use less energy, and reduce particle and nitrogen oxide emissions by more than 60 percent.

Expertise and teamwork

"Deep expertise and professional collaboration were the most important factors in the success of this challenging project and in the high degree of satisfaction of our customers," says Donaubaier. "The result was a standardized total solution for the furnace and the float area that unified the firing systems and the control system." ■

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■ SEMI PV02

The Standard for Efficient Machine Integration

The cost of connecting a manufacturing execution system (MES) can be drastically reduced with a uniform interface for production components and machines from a wide variety of manufacturers. Siemens offers the appropriate solutions together with its Automation Solution Partners.

To be able to react to changes, increase efficiency, and reduce production costs, companies need to link their production data with business output data and evaluate it in real time. In the production environment, this task is typically carried out by an MES, which serves as the operational tool for the control of the technical order processing and as the link between production and enterprise resource planning (ERP) systems.

Simpler integration

Standard mechanisms such as SQL, ODBC, and XML have been established for connecting to ERP systems. In contrast, the connection of machines was previously a real challenge, since they provide MES-relevant data in different ways or not at all. This led to high individual engineering expenses. In order to simplify integration and standardize the interface, photovoltaic manufacturers, suppliers, software providers, and research institutes, led by the Fraunhofer Institute for Production Technology and Automation (Fraunhofer IPA), formed a working group that developed a PV Equipment Interface Specification (PV-EIS) and in 2009 published the "SEMI PV2 Guide for PV Equipment Communication Interfaces" as a guideline and

framework for the standardization of communication interfaces in photovoltaic production plants.

Interfaces for machine manufacturers and operators

The SEMI PV2 standard originated in the semiconductor industry and was adapted for the solar sector. These software solutions enable fast, easy, and cost-effective connection of a wide variety of machines to the MES. There are already several solutions available that implement the SEMI PV2 standard. For example, two Siemens Automation Solution Partners, AIS Automation Dresden GmbH and acp-IT AG, offer PV2-compliant interface solutions that are independent of the MES in use. The solutions are based on a software adapter at the control level of the machine – the Simatic S7 Classic PLC or the PC-based Simatic WinAC RTX Controller – and a corresponding interface to the host system at the MES level. The controller also functions as a data concentrator and reduces the communication load on the network.

The advantage of this approach is that specialists for automation do not need any ERP or MES knowledge, and IT specialists do not need to intervene in the automation. Machine manufacturers can install the

**Eckhard Schöbel, Director of Research and Development,
AIS Automation Dresden GmbH, Germany**

»Vertical integration has been solved.«

With some 160 employees, Dresden-based AIS Automation develops and installs complete software solutions for automation technology worldwide, including for clients in the solar industry. Together with Siemens, AIS Automation developed an interface for the semiconductor industry that will be used in the solar sector as well. This interface can be used for the high-speed data transfers that are required for the optimization of production processes. In this way AIS is preparing itself for the optimization of complex process steps (Advanced Process Control – APC) in the solar sector.

When the company was founded in 1990, Siemens was its most important supporter, and the close partnership has

stood the test of time. AIS Automation also benefits from Siemens' reputation and international marketing efforts.

Eckhard Schöbel, director of research and development at AIS Automation, is already thinking a few steps ahead: "Vertical integration based on the SEMI PV2 standard has been solved. Now we need a counterpart for horizontal integration using fast networks like Profinet, since production plants themselves have up to 16 interfaces for the various components. Single-wire interfaces have been standard in the semiconductor industry for 15 years."



**Karl-Heinz Frank, COO, advanced clean production –
Information Technology AG (acp-IT), Germany**

»Standardization is required for simple, fast, and cost-effective integration.«

acp-IT in Stuttgart offers complete MES solutions for control, monitoring, and optimization of production processes. acp-IT has created

a machine interface that can be connected to any MES or Supervisory Control and Data Acquisition (SCADA) system and also offers integration support for OEMs.

Machine manufacturers can install PLC Connector on their systems themselves without special SEMI PV2 expertise. Using an Excel template, they can configure alarms, variables, and commands. The software automatically generates a PLC code that is loaded onto the machine. Then test tools can be used to test the functions. PLC Connector documents the configuration

process automatically in MS Word. This procedure also allows changes, additions, or error corrections to be quickly and easily implemented.

Both sides profit from the partnership with Siemens, but it is first and foremost the OEMs and end customers that benefit. acp-IT also appreciates the international marketing of Siemens – the Stuttgart-based company sees great potential particularly in the Chinese photovoltaic market. Karl-Heinz Frank, COO of acp-IT, is certain about one thing: "Standardization is required for simple, fast, and cost-effective integration. In the future, machines will be able to be connected using plug and play and will automatically make themselves available for detection – process operators will be able to get along fine without special engineering knowledge and thick manuals."

software on their systems themselves without special SEMI PV2 expertise. Using Excel templates or a graphical interface, they can configure alarms, variables, and commands quickly and easily. The OEM also profits from higher availability, since data are available in the buffer memory even during interruptions in communication.

Increased efficiency

The SEMI PV2 standard and the interfaces based on it are required for completely integrated total solutions in the solar industry. For line operators,

they make the integration of the machines much easier and enable complete transparency from the management to the machine level, making an important contribution to efficient and cost-optimized line operation. ■

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www.ais-automation.com
www.acp-it.com



For Gerald Taraba, the cooperation with Siemens is an important aspect of Actemium's success in the solar industry



Siemens AG/W. Geyer

■ Actemium Controlmatic GmbH, Germany

“Competence is exceptional on both Sides.”

In recent years, Actemium has continuously expanded its activities in the solar industry. We spoke with Gerald Taraba, authorized officer and division manager at Actemium Controlmatic, about its project-related partnership with Siemens.

Mr. Taraba, what services are provided by Actemium, and what does the company do in particular with regard to the solar industry?

Gerald Taraba: As a system integrator, we use our knowledge in the service of our customers and offer them individual solutions precisely tailored to their requirements. We advise our customers on a system-independent basis and recommend to them

the products that best meet their requirements. We then integrate these products. This means that Actemium itself does not manufacture anything, but instead recommends and integrates the products of system manufacturers such as Siemens. For us as a certified Siemens Automation Solution Partner, Siemens is both a supplier and a partner. We at Actemium have the required industry expertise,

and Siemens contributes the corresponding experience and competency with regard to the implementation of electrical systems. In other words, the customer has a problem, we provide the solution, and Siemens provides the appropriate product. It's an extremely good fit. The solar industry is one of the many sectors in which we operate as a system integrator and in which we can take full advantage of this collaboration with Siemens.

And what exactly does a complete system integration within the solar industry look like?

Gerald Taraba: For example, when a new plant for the manufacture of polysilicon is to be built, we can immediately go into the consulting phase if requested. All possible aspects can play a role here: from automation concepts to optimization or maintenance strategies. Then we carry out the basic, detailed, and software engineering. In the detailed design of this electrotechnical equipment, we draw on our extensive specialized knowledge. As I said before, to carry out these automation tasks we make use of the systems of leading manufacturers – Siemens, for example.

You previously mentioned the partnership with Siemens. How did this collaboration come into being?

Gerald Taraba: There were several reasons for this. First, of course, Siemens technology has high market penetration in many industries. Since it is very well known, many of our customers from the solar industry explicitly requested Siemens technology. And since Siemens has such a presence in Germany, it was logical from our point of view that we found each other at such an early stage and sought to establish a long-term cooperative relationship. This collaboration is also especially close in the solar area because competence is exceptional on both sides. Siemens has already implemented many projects in both the solar and glass areas, and the company offers a product portfolio that is in part specially tailored to the requirements of the solar industry. In addition to solution expertise, at Actemium we also have extensive product expertise with the Siemens portfolio. Due to this excellent fit on the project level, customer satisfaction is always very high. In the implementation of facility management and control systems (FMCS), we also collaborate with Siemens.

What are facility management and control systems (FMCS) used for? And to what extent can Siemens technology be used?

Gerald Taraba: Facility management and control is a general approach pursued with many complex production plants, including those in the solar

industry. This approach is primarily used for the optimization and energy management of the plant. FMCS also play an important role in many of our projects, allowing us to gain a great deal of expertise in this area over time. The basic idea is that complex production sequences can be more precisely viewed through this approach, making it possible to ensure high availability of the plant at all times and avoid losses. Such supervising



Actemium Controlmatic GmbH

Actemium is a service provider for various industry sectors such as electrical engineering, measurement and control technology, automation, and MES. The company's key strength is project management from planning to commissioning.

- **Number of employees:** 800
- **Founded in:** 1964
- **Headquarters:**
Strassburger Strasse 1,
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systems do not just concentrate on individual production steps or supply systems, as is often the case, but instead combine a range of information in an intelligent manner. But to be able to implement an optimization system like this within a plant, you of course also need the corresponding technical equipment. In previous projects, we made repeated use of Simatic PCS 7, for example. Siemens is a reliable partner and supplier that can provide the appropriate technology for us in this area as well.

Mr. Taraba, thanks for speaking with us.

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www.siemens.com/glass-solar-industry
www.actemium.de

■ Meyer Burger AG, Switzerland

“Wired” for Innovation

Technology and market leader Meyer Burger uses a new modular drive system for wire sawing silicon wafers and achieves the highest possible cut speeds with ever thinner cutting wires.

Wire saws are the first choice for cutting silicon ingots into ultrathin wafers for the photovoltaic and semiconductor industries. The technology and global market leader in this field is Meyer Burger AG, based in Thun in Switzerland. The company's wire saws meet the highest standards for quality, minimal cut losses, and maximum process reliability, and are distinguished by the best total cost of ownership (TCO).

With the use of the newest technologies, even good machines and processes can be further optimized. Thus the companies involved are constantly working on designing the

wires and wafers to be thinner and thinner so that cut losses can be minimized. Thinner wafers reduce the quantity of silicon per wafer, which leads to lower costs per installed watt of photoelectric output. But thin wires require highly precise control. Meyer Burger thus prefers to rely on control and drive technology from Siemens for its wire saws in order to secure and further expand its technological leadership position.

Avoiding wire breaks

The principle of a wire saw for silicon wafers is comparable to that of an egg slicer. The wire is wound over two wire guide rollers driven in a master/slave coupling so that a wire field is created. The wire, which is several hundred kilometers long, is transported at a speed of up to 20 m/s by a winder and an unwinder, each of which has its own dancer regulator for constant wire tension. The saw load of up to 1,000-millimeter-long silicon blocks is lowered from above onto the wire field at an adapted feed rate, allowing ultrathin wafers to be cut. It is not the wire itself that provides the cutting effect, but instead a continuously fed abrasive fluid of silicon

For its applications, Meyer Burger depends on the Sinamics S120 modular drive system with integrated safety functions



carbide / diamond powder and glycol, making up what is known as slurry. The focus is on avoiding wire breaks, which in most cases lead to the complete destruction of the ever more expensive base material.

A powerful and flexible drive system

For this demanding task, Meyer Burger relies on the compact Sinamics S120 drive system with integrated safety functions. Thanks to its modular structure, it is scalable in performance and functionality and can be used in a flexible manner. A very compact multi-axis system was implemented with active line modules (ALMs) for supply and several motor modules for the main, winder, and transfer axes. The integrated safety functions in Sinamics S120 provide for safe shutdown of the drives. For the wire-sawing machine, the STO (Safe Torque Off) function is used. The two winders are driven by compact water-cooled asynchronous motors, and the axes for the transfer equipment and dancers are driven by highly dynamic Simotics S-1FK7 servomotors. A Simotics S-1FT7 provides for highly precise workpiece advancement, even at extremely low speeds. The entire drive intelligence is in the CU320 control unit, enabling centralized drive diagnostics. The control unit is connected with the other components of the drive system through the Drive-Cliq digital system bus. The electronic nameplates of the servomotors are also read out via Drive-Cliq, which accelerates both the initial commissioning and any required replacements.

Engineering time and costs are reduced by the use of Drive Control Chart (DCC) for Sinamics. DCC brings together modern, scalable drive technology with simple, graphical programming using an extensive library of premade multiple-instance-capable drive control blocks (DCBs), including control,

computing, and logic modules. These can be easily interconnected into individual drive solutions using drag and drop. The distributed, drive-proximate control reduces communication and relieves the overlying PLC. The automation and drive solutions developed by Meyer Burger together with Siemens also include Smart Energy Management for monitoring and bridging grid failures. This is especially important, as the machines are usually used in countries with unstable power supplies.

Automation from a single source

The overlying Simatic WinAC PLC runs on a PC and communicates via Profibus with the distributed Simatic ET 200S Compact peripheral subassemblies and the Sinamics S120 drive system, and via Gateway with an AS-i bus system. A Meyer Burger-developed user interface and a process management system that records and visualizes product and process information on an ongoing basis also run on the PC. Remote diagnostics and maintenance are possible on the PC as well. "The end-to-end use of automation technology from a single source is advantageous in many different ways for a machine manufacturer operating globally," says Alexander Beck, head of sales and marketing at Meyer Burger Wafertec. "We like to make use of the expertise and support of Siemens' worldwide service network, and our customers appreciate the availability of spare parts around the globe whenever a fast delivery is required." ■

info

www.siemens.com/glass-solar-industry

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**»The end-to-end use of automation technology
from a single source is advantageous in many ways
for a machine manufacturer operating globally.«**

Alexander Beck, Head of Sales and Marketing, Meyer Burger Wafertec

■ SCHMID Group, Germany

Optimization on all Levels

In order to further optimize its production processes and better meet customer requirements, the SCHMID Group chose the Plant Simulation software from Siemens.

The SCHMID Group, headquartered in Freudenstadt in Germany's Black Forest region, is a global provider of system and process solutions for printed circuit technology and flat-screen production as well as for photovoltaics for thin-film applications and the manufacture of solar wafers, cells, and modules. The company's product portfolio includes both individual machines and turnkey production lines. In order to further optimize certain processes and recognize any weak points in the value chain at an early point in time, the technology team at the company decided to implement Plant Simulation.

Detecting and eliminating weak points in advance

The Plant Simulation material flow simulation software is an event simulation tool that allows even highly complex production systems and processes to be mapped in computer models in a way that is very easy to understand. The software is a component of the Tecnomatix product line and is integrated into the Siemens PLM total solution for planning, analysis, and optimization of production processes. It allows material flow and resource utilization to be optimized on all levels of the enterprise. Based on models created using Plant Simulation, such as production plant models, the characteristics of the systems can be analyzed and their performance optimized. The computer model allows the user to carry out experiments and simulate "what if" scenarios without interrupting actual production. In this

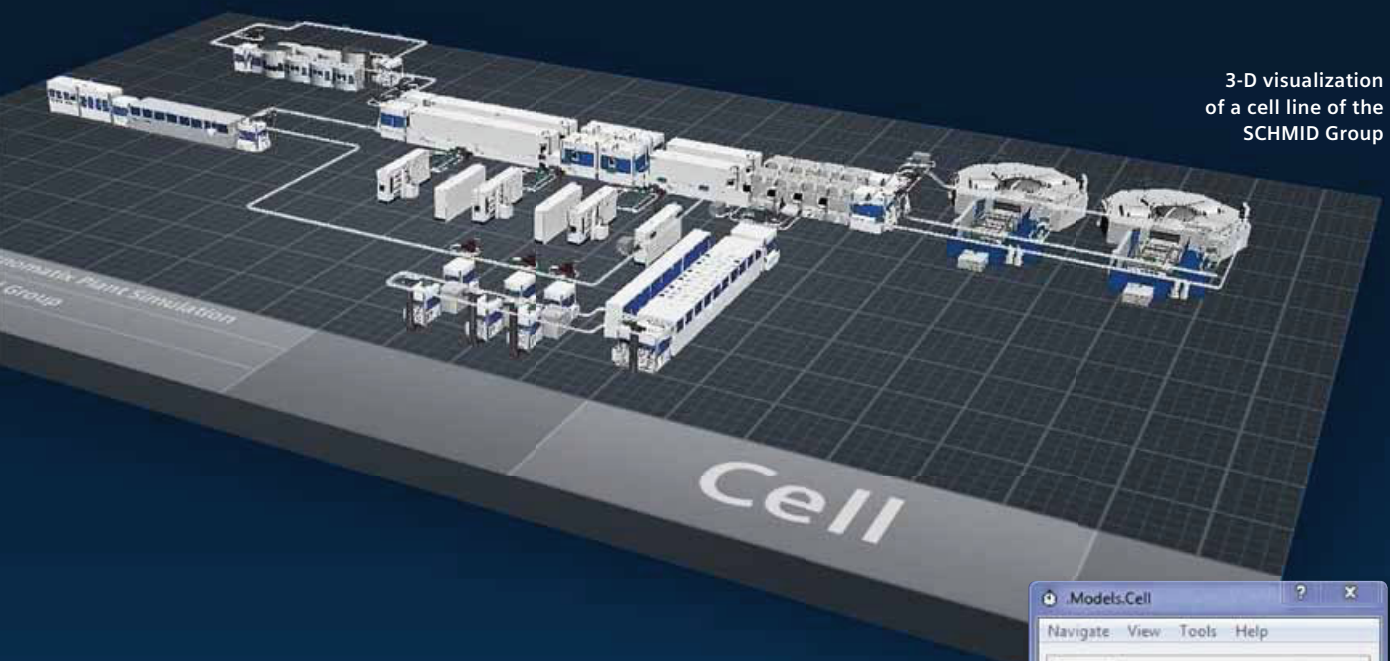
way possible problems in the production sequence can be detected in advance, and expensive, time-intensive correction measures can be avoided.

Improvements on all three production lines

All these advantages convinced the SCHMID Group to use Plant Simulation. The company wanted to use the software to identify possible weak points in the production sequence, and it also wanted to analyze scenarios that had not yet been tried out in practice. In addition, verified conclusions regarding the utilization of employees were to be drawn, the number of workpiece carriers was to be verified and optimized,

All advantages at a glance

- ▶ 15–20 percent increases in the productivity of existing production equipment
- ▶ Up to 20 percent reduction in the planning investment for new production plants
- ▶ 20–60 percent reduction in stock levels and throughput times
- ▶ Optimization of system dimensions
- ▶ Reduced investment risk through feasibility analyses at an early stage
- ▶ Increased resource utilization
- ▶ Improved line planning and occupancy
- ▶ Improved cost/benefit ratio



3-D visualization
of a cell line of the
SCHMID Group

and the material flow controller (MFC) were to be tested. For all three photovoltaic production lines – the wafer, cell, and module lines – corresponding models were created with the software. Output and strategy scenarios, as well as testing of control strategies, were the highest priority for the SCHMID Group. With regard to the output scenarios, the focus was on maximization of throughput. For the strategy scenarios, travel path optimization of the transport shuttles was the objective.

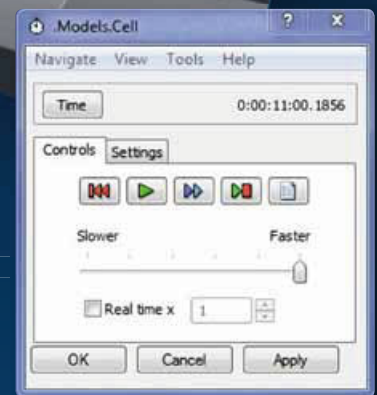
The benefits for the company soon became apparent on all three production lines. On the wafer line, the line structure was optimized through the comparison of two diverters at the end of the line. In addition, the number of required transport trolleys could be verified. On the cell line, the travel strategies were checked and validated in simulations. In the process, the station function was optimized and the ideal number of shuttles was determined. It was also possible to determine the transit time of the machine operator on the cell sorter. Last but not least, the processes on the module line in the area of the fulfillment and buffer strategy of the laminator could be made more efficient.

Software makes an important contribution to increasing efficiency

Through the simulation, analysis, and subsequent visualization of the production processes, the SCHMID Group was able to achieve the goals it set for itself and considerably optimize its production sequences. The virtual commissioning of the MFC, as well as its final optimization, also met with

success. Thanks to Plant Simulation, interventions could be made at an early stage on the MFC test client. That accelerated not just the test series but also the entire MFC development.

At the SCHMID Group, all lines planned in the future will be tested in advance using Plant Simulation. The company's decision makers were enthusiastic about the fast and straightforward generation of functional models within a virtual 3-D environment. Thanks to the simple user interface, which corresponds to Microsoft Windows standards, it was easy to learn and apply the software. The easy linking with the existing automation technology was also quite popular. ■



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www.siemens.com/glass-solar-industry
www.schmid-group.com

■ Singulus Stangl Solar GmbH, Germany

Fail-Safe and Maintenance-Free

The demand for systems for photovoltaic production is increasing. Maintenance-free components such as PC-based automation solutions and power supplies that bridge grid failures minimize outage risks and make the production of solar cells even more reliable.

Singulus Stangl Solar GmbH is a subsidiary of Singulus Technologies AG. The company, based near Munich in Germany, manufactures special machines for wet chemical processes in the areas of photovoltaics and semiconductors. The solar expert has specialized in solutions for silicon and thin-film solar technology. Its product range includes both automated systems for a variety of finishing steps for wafers and solar cells as well as solutions for the elimination of saw damage and for chemical cleaning of wafers.

Doping of the wafers in a diffusion furnace is among the important process steps for solar cell production. For transport through the diffusion furnace, the silicon wafers are placed into what are known as boats. During the doping, the boats are coated with an undesirable phosphorus glass layer that needs to be removed in an acid-treatment process that uses hydrofluoric acid. For this the boats are discharged from the process sequence and fed into the cleaning plant. The cleaning is performed by boat cleaners produced by Singulus Stangl Solar. After the fully automatic acid-treatment process ends, a subsequent rinsing process removes chemical residues.

A powerful industrial PC controls all processes

For the automation and low-voltage switching technology of the systems, Singulus Stangl Solar has for years relied on proven Siemens technology. The newly developed boat cleaners were also equipped with Siemens components. A Simatic IPC427C Microbox PC in combination with a 24" screen installed on a movable operating console on the front panel of the machine was chosen. Using

this powerful industrial PC, it is possible to control and monitor all steps during the various cleaning processes. As an embedded PC, the Microbox is equipped with PLC WinAC RTX software as well as WinCC visualization software and is distinguished by its high performance and ruggedness in maintenance-free continuous operation.

A reliable power supply despite voltage fluctuations

The boat cleaner is controlled by the Simatic WinAC RTX software controller. In conjunction with the Sitop uninterruptible power supply, the data are permanently retained. The controller controls the distributed peripherals via both Profibus and Profinet.

"So that brief voltage drops would not immediately lead to plant malfunctions, we safeguarded the 24 V power supply with the Sitop PSU100M power supply unit with 20 A," explains Kai Plachner, manager of electrical engineering at Singulus Stangl Solar. The compact single-phase device has an input voltage range of 85 to 275 V AC. It enables a reliable 24 V power supply even in the event of large voltage fluctuations and is designed for brief output peaks of one and a half times the rated current lasting up to 5 seconds.

The power supply unit is optimally complemented by the Sitop UPS500S uninterruptible power supply, which Plachner has planned for 24 V buffering in the control cabinet. "The Sitop UPS bridges voltage fluctuations and outages of up to a minute. This gives the operator sufficient time to save the data and shut down the Microbox-based control application in a controlled manner," says Plachner. In this way,

»A large proportion of our deliveries go to countries in which grid stability for fail-safe operation does not always exist. The Sitop components are compelling not just because of their performance but also due to their rugged and maintenance-free characteristics. The machines are thus equipped with maintenance-free UPS solutions that do a very good job of compensating for voltage fluctuations.«

Kai Plachner, Manager of Electrical Engineering, Singulus Stangl Solar GmbH



A Simatic Microbox PC controls and monitors the processes; Sitop power supply units provide for a reliable power supply



The boat cleaner from Singulus Stangl Solar removes chemical residues from wafers

settings and process data are not lost. The Sitop software monitors the device workload and battery state and reports all power failures. "Voltage drops can be seamlessly compensated for with the Sitop solution," reports Plachner.

Simatic and Sitop components offer great ease of use

When selecting systems, solar cell producers are most interested in characteristics such as high reliability, minimized operating costs, durable components, and great ease of use. "In terms of performance, reliability, service life, and maintenance-free operation, the Simatic and Sitop components meet our requirements

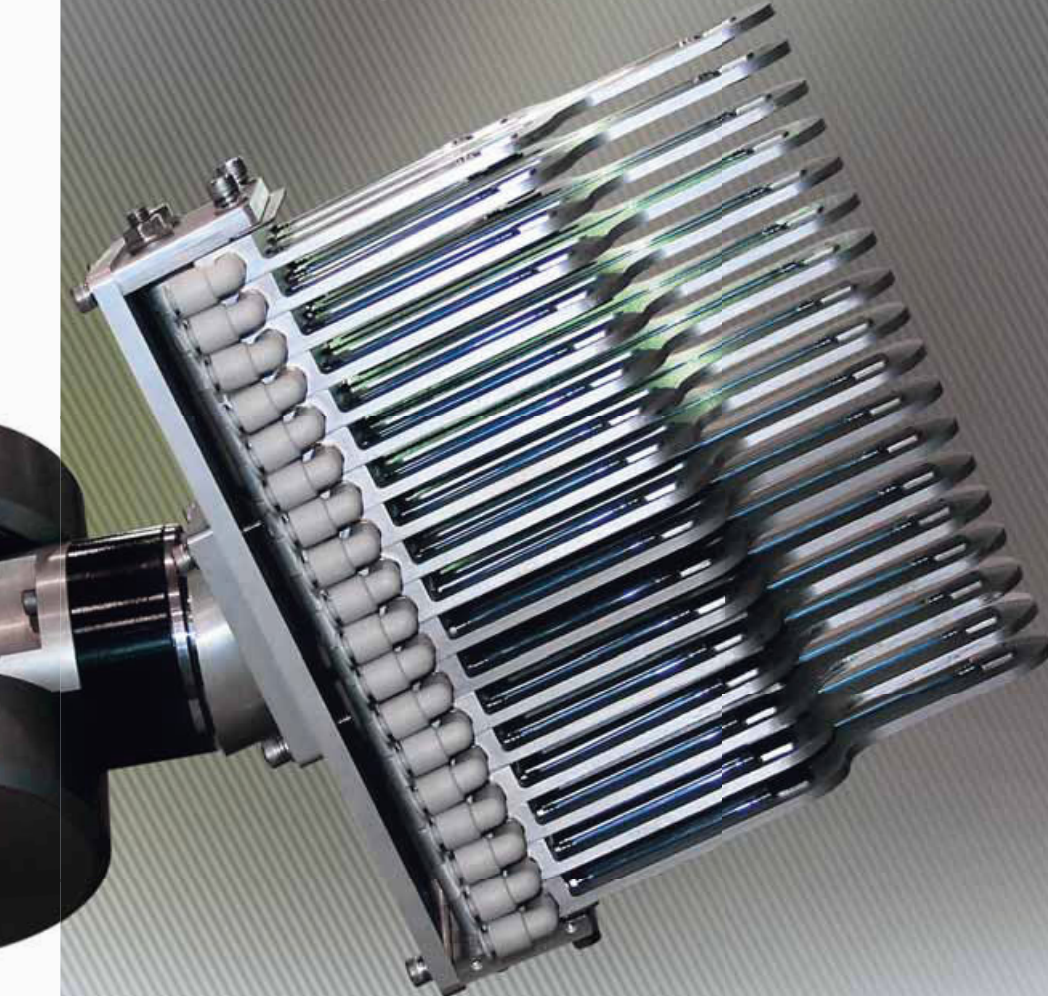
in an optimal manner," emphasizes Plachner. "We achieve great ease of use through various features, including the fact that all systems can be parameterized and operated in a uniform manner." The boat cleaner is offered in four versions. Each variant is equipped with the same Microbox-based control application. The customer then simply needs to activate the corresponding settings on the machine. ■

info

www.siemens.com/glass-solar-industry
www.stangl.de

■ HBI Corporation, China

Technology as an Engine of Growth



HBI Corporation relies on standardized automation solutions from Siemens. These allow the company to contain costs, increase energy efficiency, and grow across the entire photovoltaic production chain.

HBI CEO Boping Li comes from a research background and is still highly engaged with research today. The experienced businessman has been especially active in the Chinese photovoltaic industry for many years and is a well-known industry figure. His focus is on products for increasing the efficiency and reducing the costs of solar cells and modules. In this context he has identified special areas in which research and development can make a major contribution to increasing the yield of photovoltaic products.

In order to accelerate development, HBI works with a variety of research institutes, including

the Institute for Materials Research, an institute of the Chinese Academy of Sciences, which in turn collaborates with the German Max Planck Institute. A major research topic here is nanotechnology. This technology involves new materials that are set to replace silicon-based photovoltaic cells in the future and enable cost reductions of up to 40 percent. Alternatives to the lithium-ion batteries that have been common up until now are also being jointly developed. The goal is significant increases in storage capacity, which will eliminate current limitations and open up entirely new possibilities for photovoltaic applications.

On the way to smart fabrication

In addition to research and development, standardized automation is critical for efficient and cost-effective production of high-quality products. This is why Siemens, as one of the world's leading providers of process automation technology, agreed to enter into a close partnership with HBI on joint projects. In this way, HBI aims to integrate its Speed (Slim, Precise, Easy, Economical, Durable) equipment series into automated production plants and lines.

HBI has already implemented several automation solutions with Simatic controllers from Siemens, such as the Speed 1000 loading and unloading system. In the future, HBI wants to offer automation solutions across the entire production chain – from the manufacturing of silicon wafers to cells to finished modules – and enter new business areas. Thus HBI is planning to add automated PECVD (plasma-enhanced chemical vapor deposition) plants to its plant portfolio. These include plants for antireflective coating and passivation of crystalline silicon solar cells as well as plants for plasma etching for edge isolation and other dry-etching technologies. Siemens offers the corresponding systems and solutions and has a great deal of development capacity at its disposal. "Totally Integrated Automation is an overarching and standardized automation concept from Siemens for the entire production chain. It will allow us to reach our goal – smart fabrication – together with Siemens. Our customers profit from complete solutions for the entire photovoltaic production chain, and we can continue to increase our competitive advantage," says Li. For Siemens, this collaboration means another important step into the Chinese solar market.

Innovation as an engine for growth

Sixty percent of the world's photovoltaic products are produced in China, with 70 percent of these products being made in the region around the mouth of the Yangtze River. This makes the region the world's largest center for the manufacture of silicon wafers, solar cells, and solar modules. The 10 Chinese global market leaders for photovoltaics have their headquarters there.

In the medium term, China has the potential to develop into the largest international market for photovoltaics. The crucial success factors are productivity, cost, and quality. Research and development, as well as automation, are also prerequisites for the growth sought in the Chinese solar industry.

As one of the country's driving forces in terms of technology, HBI Corporation has a clear emphasis on research and development, including research into nanoelectronics for the development of new materials.



"Automation is the key to new photovoltaic business opportunities, not just in China."
Boping Li, CEO, HBI



The new HBI company building in Nanjing

The company collaborates with a number of institutes, such as the Chinese Academy of Sciences. Now HBI and Siemens, as one of the world's leading providers of process automation, have agreed to enter into a close partnership on joint projects.

In this way, HBI wants to offer automation solutions across the entire production chain in the future – from the manufacture of silicon wafers to cells to finished modules. HBI sees Siemens as the ideal partner for further business development on the way to smart fabrication. For Siemens, the collaboration means a further step into the Chinese solar market. The partners see the most important common goals as the technical improvement of photovoltaic products themselves as well as the development of new automated machines, plants, and factories for cost-effective and energy-efficient production. ■

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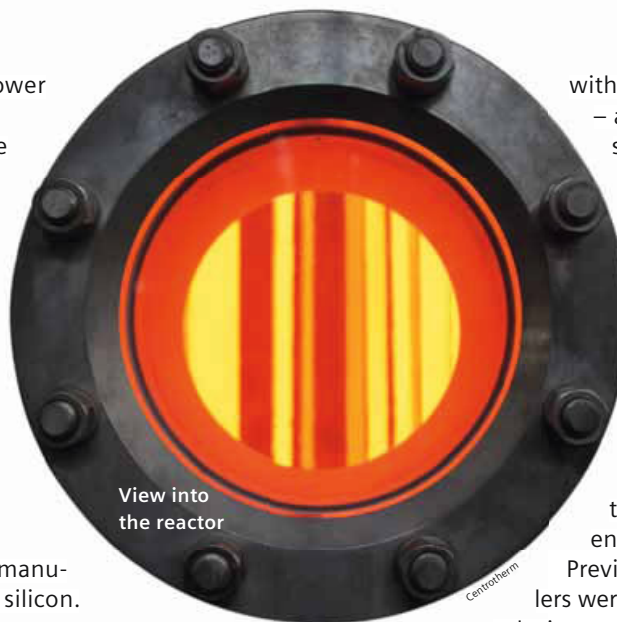
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en.hbicorp.cn

■ Poly Power Unit

A Building Block for Optimized Polysilicon Production

The Poly Power Unit rounds out the offerings for automation solutions for the manufacture of polycrystalline silicon. It is directly integrated into the process control system and supplies the reactor with electrical power.

In the solar industry, power controllers supply the electrical power for the Siemens chemical vapor deposition (CVD) reactors – the process used by the overwhelming majority of all polysilicon plants. These reactors need to withstand extreme loads and be sufficient for the given requirements. The Poly Power Unit was the last building block needed to create a comprehensive industry solution for the manufacture of polycrystalline silicon.



with the control technology – and this happens in a very sensitive area, the power supply in the reactor area. Accordingly, the new power controllers are integrated into the Simatic PCS 7 control system. In this way, energy management functions can be integrated, along with Advanced Process Control algorithms or a temperature-controlled energy-input control circuit. Previously, the power controllers were excluded from integrated

Space-saving, modular, and flexible

The design of the power controllers is characterized first and foremost by excellent cooling properties as well as minimal space requirements. A rigid cabinet design is not required, which greatly simplifies the maintenance of the individual components. Thanks to flexible parameter assignment using software, they can also be precisely integrated into the production systems, which enables continuous process adjustments and improvements at a later time. The combination of high-quality components and efficient design also provides for an especially wide current and voltage range. At the same time, proven standard power electronics are combined with an intelligent control system in the modules.

Gas/energy optimization creates new opportunities

New opportunities relating to process optimization are created for the operators of polysilicon plants in another respect as well. Thanks to Totally Integrated Automation (TIA), the power electronics grow together

solutions and thus from possible process optimization. But thanks to the integration of the Poly Power Unit into the overall automation solution, seamless control systems such as interactive gas/energy optimization are now possible.

Efficiency through integration

With its solutions for the solar industry, Siemens wants to make photovoltaic modules more efficient and cost-effective. "Our newly developed power controllers are integrated into the entire process control system. In this way the supply of electrical current in the reactor can be precisely adapted to the gas supply. This makes silicon production much more efficient," says Bernhard Saftig, vice president Vertical Glass & Solar at Siemens. ■

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■ **Simotion IT Diag**

Optimized Fault Diagnostics

With Simotion IT Diag, machine manufacturers can carry out commissioning as well as diagnostics and service of production machines without additional engineering tools.

As is the case in many other industries, the glass industry produces around the clock. This means that downtime needs to be avoided so that productivity is not jeopardized. Efficient fault diagnostics are essential in this context. Simotion IT Diag offers not only optimal fault diagnostics but also rapid commissioning as well as the possibility of troubleshooting from anywhere in the world.

Efficiency through standard web tools

Through an integrated Industrial Ethernet or Profinet interface, Simotion platforms C, D, and P offer the opportunity to communicate with the outside world without the Scout engineering system. They communicate with standard IT technologies such as HTTP, TCP/IP, or HTML, with the user able to connect with the control system using cables, a secure connection, or the Internet. The simpler, faster, and more efficient commissioning is, the better. With Simotion IT Diag, Siemens has already created a number of standard web pages that the user can use with a standard browser. In addition, OEMs can easily integrate their own web pages for commissioning and parameterization of the machine, for example. Access rights provide for secure, user-role-specific access to these pages.

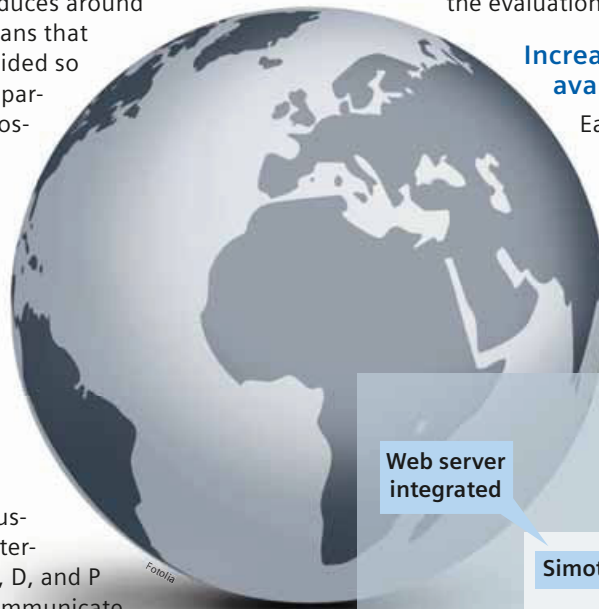
Easy diagnostics via the Internet

Standard tools are also sufficient for fault diagnostics. If the user calls up the standard web pages of Simotion IT Diag, an interactive interface allows him or her to compile the data from a symbol-based browser and set parameters for the trace, including triggers. Free graphical software with zoom, scaling,

and measurement cursor functions is available for the evaluation of the recorded data.

Increased machine availability

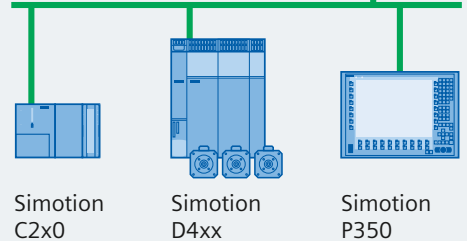
Easily finding and rectifying problems, importing upgrades and changes, and performing optimizations and tests remotely – Simotion IT Diag makes it all possible. ■



Web server integrated

Simotion IT Diag

■ Industrial Ethernet



Easy diagnostics via the Internet with Simotion IT Diag

IT security note

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

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■ Siemens Industrial Automation Ltd., Shanghai

Achievements in China

In the glass industry as well as the polysilicon market, Siemens Industrial Automation Ltd., Shanghai (SIAS) has achieved a great deal in China. Glass production as well as polysilicon sites have been successfully modernized and equipped with Simatic PCS 7.

China has long been a country with a fast-growing economy and great economic vitality. The glass and polysilicon industries both exemplify this. In the last few years, the Chinese glass industry has prospered, and China's demand for high-quality glass has considerably increased. Although the Chinese construction industry will remain the largest market for glass, the demand of the Chinese automobile and solar industries has also increased. The Chinese polysilicon market is currently growing at slower pace, but the prospects are bright. The main threat, however, arises from the

risk of excessive capacity. In terms of its impact on the Chinese glass industry and the polysilicon market, SIAS can be proud of its achievements.

Achieving the perfect win-win solution

One important step for SIAS in the glass industry has been the consolidation of the company's collaboration with China Triumph International Engineering (CTIEC), a subsidiary of China National Building Materials Group Corporation. China National Building Materials Group Corporation is a global industrial group, and CTIEC is its national scientific research



unit and its international engineering branch. CTIEC currently accounts for the highest share of glass construction projects in the domestic market. Recently, SIAS and CTIEC have managed to achieve the perfect win-win solution: together, they have modernized a wide range of Chinese glass production sites. While CTIEC provided the production lines, SIAS implemented the process control system for those production lines. Through this partnership, SIAS deepened the mutual trust between CTIEC and the end customer. Due to its know-how and performance, however, SIAS was also able to strengthen its position in the Chinese glass industry.

Positive feedback for SIAS

The management teams of the above-mentioned modernized production sites decided to use Simatic PCS 7. SIAS provided them with the necessary engineering services – such as the system design, the hardware integration, the on-site technical support, and so on. By now, the new systems have fully passed long-term tests and have proven to be rich in features and highly reliable, which satisfies all the glass production companies.

Together, SIAS and CTIEC have helped one of the largest Chinese solar glass manufacturers with its entrance into the photovoltaic glass market as well as enabling the company to forge ahead in the field of green energy. SIAS has successfully provided both of the company's projects with Simatic PCS 7 and received positive feedback after the completion of the projects.

PCS 7 for polysilicon project meets all customer requirements

When it comes to the polysilicon industry, SIAS can also look back on several significant achievements. The polysilicon project with Da Quan New Material is one example. In 2007, SIAS initiated a polysilicon project with this company. After the successful start of the partnership, the two companies negotiated another project the following year. This was one of the largest polysilicon production

China is a big market for the glass and solar industry

Selected reference projects in the glass industry:

- ▶ Shenzhen Nanbo, glass production line
- ▶ Shanxi Lihu, distributed control system (DCS)
- ▶ Chongqing, glass production line
- ▶ Dongtai, DCS
- ▶ Li Hu, glass plant

Selected reference projects in the polysilicon industry:

- ▶ Yichang CSG Polysilicon Co. Ltd.
- ▶ LDK Polysilicon Co. Ltd.
- ▶ TianWei Sichuan Polysilicon Co. Ltd.

facilities ever established in China. Once in operation, the facility helped relieve the shortage of raw materials on the Chinese solar energy market. Furthermore, it helps make the Chinese solar energy industry more competitive in international marketing.

Simatic PCS 7 was also chosen for this project, since the process control system met all the requirements of the customer. SIAS was responsible for the engineering of the automation system for the entire production process. The engineering service included hardware and software supply for the traditional control systems as well as for the fail-safe control systems, project management, application software design, systems integration, commissioning, testing, and customer training. ■

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www.siemens.com/glass-solar-industry
www.ctiec.net

■ **Bach Viet Technologies Corporation, Vietnam**

New Vision

The future looks bright for a vehicle windshield manufacturing plant in Vietnam following the upgrade of its control systems to Simatic S7.

Several Tamglass advanced automatic windshield bending furnaces have been operating in Vietnam for many years, but inevitably as the equipment aged it fell behind in terms of performance and maintenance costs compared to more modern equipment. Many Tamglass customers recognized that in order to remain competitive, they needed to upgrade the control systems of the windshield bending furnaces. An upgrade would reduce maintenance costs, improve temperature control, and increase machine speeds. The bending of laminated vehicle windshields is a sophisticated process with many system variables, nonlinear behaviors, and long temperature time constants. Another serious challenge is that windshield bending furnaces are often required to produce many different sizes and profiles of windshields, each requiring its own unique set-up.

Curving windshields

To bend a windshield, the glass is first heated to a carefully controlled profile. The heating is not uniform, but selective heating is applied to critical areas of the glass where complex bending processes take place. After bending, the glass is annealed. That is, the windshield is cooled using a carefully controlled

profile to produce a windshield with accurate physical dimensions that is free of optical distortion. The glass temperatures are monitored throughout the process, and if variations from the optimum profile are detected, the control system automatically adjusts the heating pattern.

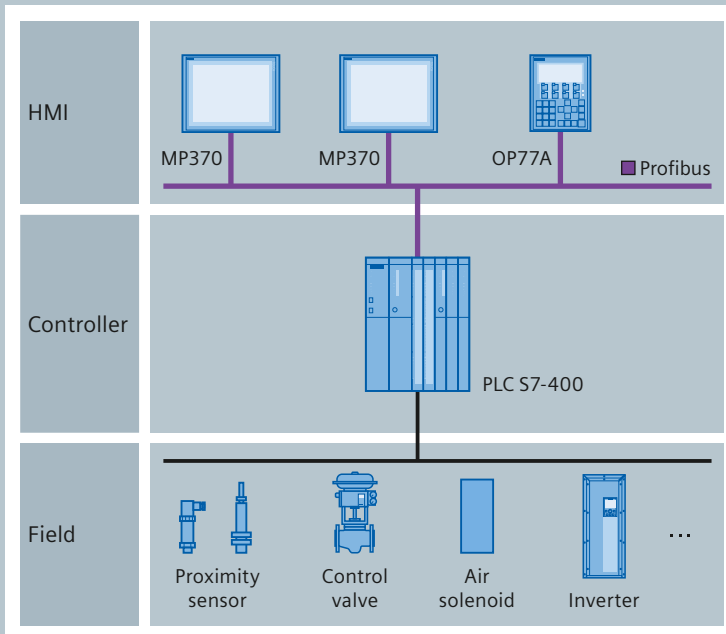
System requirements

In order to ensure the performance of the windshield bending furnaces after upgrading, a number of key requirements were defined. For the implementation of the upgrade, production was to be interrupted for no more than three days. The new system had to be inexpensive and easy to use with minimal maintenance, and utilize the latest technology standards. Performance enhancements were required for the PID (proportional-integral-derivative) feedback controllers to improve both product quality and throughput. Siemens won one of the contracts to upgrade the furnace control system in close collaboration with its local partner in Vietnam, Bach Viet Technologies Corporation (Bavitech).

Migration strategy

The original system consisted of a dual-CPU Simatic S5 PLC, an IP244 temperature controller module, an

System configuration



Project highlights

Original system	New system
S5 CPU 928 x 2 & coordinate module	S7-400 414-2
S5 I/O modules	S7 I/O modules
S5 IP 242	S7 PID-PULSE function block
CP 580 & CRT monitor	MP 370
OP 396	OP 77A

- Conversion and modification of S5 programs to S7 using Siemens software and Bavitech tools
- HMI programming
- Installation of a temporary control cabinet to switch over quickly between the old and new control systems

IP242 machine speed/position controller, 500 I/O points, and a CP 581 system controller with a monochrome CRT monitor. More than 400 control programs had been developed for the manufacture of windshields of different specifications. The S5 PLC was replaced with an S7-400, the most powerful PLC in the Simatic controller family. An S7-400 system consists essentially of a backplane, a power supply, and a CPU. The rugged, fan-free system is modular and extremely flexible and can be used with a wide range of modules and distributed structures.

The power of the S7-400 allowed for significant economies in developing the new control system. For example, the S5 IP242 in the original system provided the motor control functions, driving the motors in either continuous, step, or pulse-duration modulation modes. In the new S7 system, all the motion control processing is provided via software by motion control modules running in the S7-400. The original CP580 system control module and monochrome monitor were replaced by two MP370 Simatic Multi Panels. The rugged color touchscreen multifunction flat panels provide process information and enable the direct input of operator and programming commands.

Switchover

Over a 10-week period, the Siemens engineers, together with the Siemens partner in Vietnam, Bavitech, converted all 400 S5 programs to S7 and programmed the HMI for the MP370 Multi Panels. When it came time for installation, only two days' shutdown was required to install and commission the new equipment.

The S7 control system provided all the functions of the original system together with new utility functions and improved the performance of the critical temperature-feedback control and motor control functions. Key to the success of the project was the Siemens migration strategy that provided a seamless compatible upgrade path from a system two generations back to the latest technology. With the updated control system, the customer can meet the highest global standards in terms of cost efficiency, process quality, and product quality in vehicle windshields. ■

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Grenzebach uses industrial robots to remove the panes from a transport track, correct any skewing, and create precise stacks

■ Grenzebach Maschinenbau GmbH, Germany

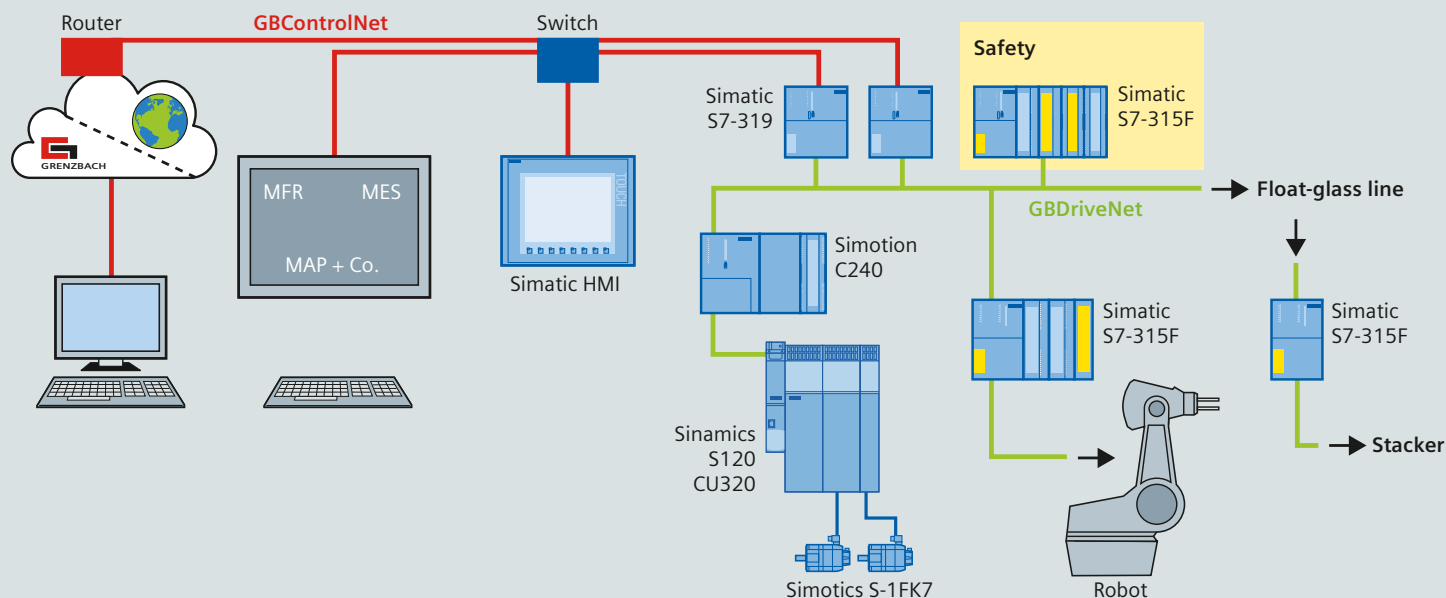
Universal Plant Concept ensures Efficiency

Through a new control concept for its machine and plant components, Grenzebach simplified project planning and commissioning and increased planning reliability.

With its handling, processing, and automation technology, Grenzebach Maschinenbau GmbH has ensured a position for itself as a high-performance partner of companies in the flat glass industry. The machine builder, which has its headquarters in Hamlar, Germany, plans, manufactures, and delivers complete plants and individual components for the manufacture and processing of continuous glass sheets along with systems for process monitoring and quality inspection. The most recent development is a standardized control architecture that enables more efficient resource use and guarantees optimal plant function. It is a global and cross-industry control concept that is also used in solutions for other industries in which Grenzebach is active. "The new system platform expands our portfolio and allows us to flexibly respond to the complex requirements of flat glass producers," explains Roland Jenning, head of research and development at Grenzebach. Company

acquisitions had led to a situation in which the various plants had different automation strategies, with hardware and software solutions provided by a variety of vendors, making the transfer of expertise much more difficult. Roland Jenning continues: "In the meantime we have reduced the variety of systems and concentrated on the main supplier, Siemens." For example, the standardization allows the electrical system designers to use a preconfigured drive train from a library and make immediate use of it, since the same components are always involved. Hardware and software modules are coordinated with each other and can be used from a library for modular design.

The systems developed and manufactured by Grenzebach are for the cold end of the flat glass production line. After leaving the hot area, the continuous glass sheet is transported on a conveyor belt to the cutting area for sizing. While metering



Automation of the Grenzebach flat glass plant

wheels determine the transport speed, camera systems monitor the glass quality and provide the flaw detection system with information about any imperfections (air bubbles, tin residue, etc.). The cuts are optimized based on the positions of the flaws. The shard-return system returns the pane areas with flaws to the glass-melting furnace along with the unusable edge areas of the glass sheet.

Simulation of the process sequences

Depending on production capacity, float glass plants are equipped with a large number of automation components. Between 10 and 20 Simatic S7-300 controllers are installed for the various tasks. In accordance with customer requirements for 24/7 operation, the redundant line controllers are equipped with Simatic S7-319 units. In the handling cells equipped with stackers or robots, Simatic S7-315F or S7-317F units are used. The wide variety of movement tasks are powered by 60 to 250 Simotics S-1FK7 synchronous motors. Simotion C240 motion control systems are installed throughout the plants.

Drive control is performed by the Sinamics S120 (CU320) modules, which communicate with Simotion via Profinet. Grenzebach developed the redundancy software together with Siemens. The in-house production control system is the platform on which all the processes of the float glass line run: order management, cut optimization, capacity planning, and flaw detection. A major advantage of the system is its direct connection to the distributed automation systems, which allows management, control, and monitoring of the processes in real time. The glass sheets are tracked by the flaw detection system until they are stacked at the end of the line, at which point the data are transferred to the enterprise resource planning (ERP) system. "At the same time, we developed a solution for plant simulation

that allows us to try out process sequences, since test installations are not possible due to the size of the plant," reports Manfred Bauch, automation technology manager and head of electrical engineering at Grenzebach. "After successful testing, we transfer the software to the customer's control system."

Uniform drive and control components

The standardization of the product lineup (controllers, drives, etc.) greatly reduces customized solutions. Additional synergies have resulted from bringing together the expertise of the various business areas and product lines. The modules for the control system architecture are stored in a library so that the developers can use them again. Manfred Bauch adds, "The open architecture enables integration of our development organization so that project teams are able to work together."

"The newly developed system platform can be used in a variety of industries and enables flexible and efficient resource use," explains Roland Jenning. "Time-consuming maintenance work and lengthy development times are now a thing of the past. We were also able to launch 24/7 service and remote maintenance, which make service more effective. A smaller team can cover all the product lines with service that spans multiple industries. Service technicians can quickly get their bearings, since they find only uniform drive and control components at all their customers' facilities." ■

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■ Schott AG, Germany

Innovation meets Technology

To enable the continued production of innovative special glass products of the highest quality in the future, Schott chose a reliable and standardized automation concept.

Founded more than 125 years ago in Jena, Germany, Mainz-based Schott AG is today developing state-of-the-art special glass and technical glass at a number of production sites worldwide. The primary markets of the international technology company include solar energy, pharmaceuticals, electronics, the household appliance industry, optics, and the automotive sector. In an elaborate melting and manufacturing process, some 50,000 products in more than 400 glass types are created at Schott.

Precise process knowledge required

After being melted, glass is drawn, rolled, pressed, bent, or blown as required and then subjected to further refinement. One of Schott's manufacturing processes includes the bending of flat glass for a wide variety of applications. The glass components are first heated in an upstream process and then raised to the processing temperature in a targeted

manner over gas burners. It is not until then that the process steps required for forming are started. The bending process is concluded with a cooling phase.

High flexibility, efficient production

To meet the high requirements of these and other glass production processes, Schott uses standardized automation technology from Siemens that fulfills all the requirements for precision, reliability, consistency of data, safety, and user-friendliness. The temperature control of the furnaces, the transport of flat glass, and the other peripheral equipment were implemented with powerful Simatic S7-400 units, which are optimally suited for the control and coordination of entire plants thanks to their high communication performance and integrated interfaces. The six-axis handling system, including the processing tools, is controlled by a Sinumerik 840D sl with integrated safety functions. A Simatic S7-300F is used for safe control of the burner technology and for management of the safety protective circuits as well as the emergency stop circuits. The precise positioning of the flat glass is also important. For this function a large number of Sinamics 120 servodrives are in use, which are programmed with Drive Control Chart (DCC). Redundant WinCC servers for visualization, fault reports, recipes, and so on ensure high availability of the entire plant.

The interplay of technology and innovation, as well as the reliable project implementation, impressed those responsible at Schott AG. They now feel well prepared for future challenges. ■

Bending of flat glass is one of the fields of expertise of Schott AG



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The ultrafast
stacker from
Bottero with
automation from
Siemens

■ Bottero Group, Italy

Fast Stacker

Bottero has developed a glass stacker that makes it possible to stack small sheets of glass at high cycle speeds. Simotion D and the Simotion Handling Toolbox ensure high precision and productivity.

For more than 50 years, the Bottero Group has been developing machines in production plants for flat and container glass and is today one of the world's most important producers in the industry. The company's portfolio ranges from container glass plants for the production and packaging industry to cold-end plants for float and ornamental glass and from coating and lamination systems to processing machines for cutting, grinding, and drilling.

Waiting times a thing of the past

An important step in the processing of flat glass is the stacking of cut plates of glass. In the process the glass is taken from the production line and loaded into packing racks or wooden crates. The smaller the plates, the faster the cycle times. Bottero, known for innovation, developed the FTSS (FasTStackingStock) stacker for this purpose. It is a bottom-side stacker, also referred to as a tin-side stacker, with cycle times of as little as 2 seconds for small plates. With bottom-side stackers, before transfer to the removal position, the plate usually must wait until the suction cup frame has ended its cycle and is positioned completely beneath the removal conveyor belt. The suction cup frame in turn must wait until the plate has reached its removal position. In contrast, with the Bottero solution, the cantilevered and motorized suction cup frame does not need to wait for the next plate to be positioned, since it "dives" under the next

plate while the previous plate is being inserted or positioned for removal.

The highest degree of trajectory precision at high speed

To ensure that the glass is not scratched due to the high speeds during unloading, the system depends on precise control of the stacking cycle. The crucial factor is the synchronization of all axes involved in the movement so that the glass is precisely loaded onto the rack. Bottero chose the drive-based Simotion D425 motion control system with Sinamics S120 Booksize modules. The control system ensures precise control of the axes with a high degree of repeat accuracy. For the engineering, Bottero made use of the Simotion Handling Toolbox, which has proven itself many times over with handling tasks. The integrated "path" technology object enables interpolation of three axes and thus contributes to an increase in the speed. The standardized library simplifies the programming and increases productivity. Last but not least, the engineering software makes commissioning easier, through the trace function in Simotion Scout, for example. ■

info

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■ Benteler Maschinenbau GmbH, Germany

Precisely ground Panels

For processing glass for the solar panel industry, the glass technology division of Benteler Maschinenbau uses Sinamics S110 drives, which have proven themselves for the simple and reliable positioning of individual axes.



Precise processing of solar glass with Benteler GEN2 and Sinamics S110

Benteler Maschinenbau GmbH, which has its headquarters in Bielefeld, Germany, and is a subsidiary of the international Benteler Group, has made a name for itself as a successful supplier in the automotive and glass industries. The company's product spectrum includes machines for the production of series and individual parts for the construction, furniture, automotive, and solar glass industries.

Precise positioning of the grinding discs

For the manufacture of glass for the solar panel industry, Benteler developed the GEN2 glass-edge processing machine, which is equipped entirely with drive technology from Siemens. The glass is transported using suction belts equipped with Sinamics G120 frequency converters. Their synchronous motor control ensures that the glass is not damaged. The grinding discs, which are also driven by Sinamics G120, are automatically measured, sharpened, and compensated for in case of wear. Sinamics S110 converters are the heart of the plant; they are responsible for the width adjustment of the y- and z-axes. Together with the Simotics S-1FK7 servomotors, they ensure precise positioning of the grinding discs. Thanks to the flexible positioning-set programming in the Sinamics S110, the grinding units do not need to be reset for every process, as was previously the case with the mechanical solution. Precise corner machining is now guaranteed.

Simple and efficient

Benteler particularly appreciates the new drive concept because the employees were able to quickly become familiar with the system due to the simple programming and commissioning. But it also allowed production to become more efficient, since the stored recipes enable a product change at the push of a button, and standardized automation greatly simplifies integration into the overall production process. "The modular automation enables variable processing of different glass types and easy transfer of the concepts to other machine technologies," confirms Andreas Lüttke, group manager of software development and electrical engineering for glass technology at Benteler. Benteler has a thoroughly positive impression of the new drive concept of the glass-edge processing machine: faster product changes, reduced maintenance expenses, and greater precision in corner machining. The company, which operates internationally, also appreciates the worldwide support from Siemens and the remote service option. ■

info

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Olivotto Glass Technologies S.p.A., Italy

Improved Quality

The Italian container-glass forming machine manufacturer Olivotto Glass Technologies relies on the drive-based Simotion D control system with Sinamics S120 for its machines. Sinamics S120 provides the ideal basis for modular plant and machine concepts. The advantages of the modular servodrive include its integrated safety functions, the rational engineering, and the option of rapid commissioning thanks to the associated tools.

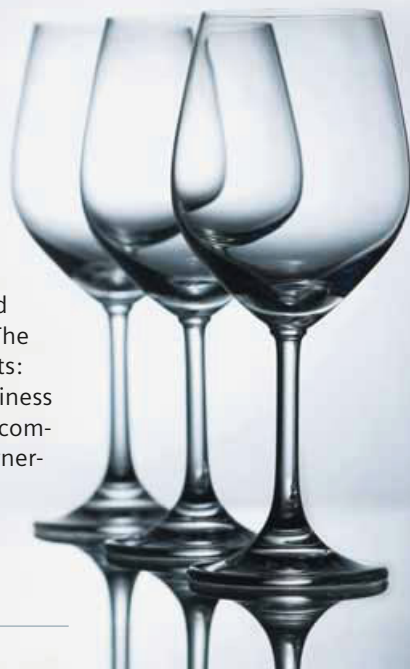
It is an intelligent solution, as use of the control system has improved both performance and ease of maintenance. A further benefit is that the functions and control algorithms called in the user program are time-synchronized with the axes. The reproducible behavior of the machine means that considerable improvements in the quality of the end products can be achieved.

Olivotto has been working in the container glass sector since 1946. Research, ongoing technical development, and innovation have enabled the company to become a leading brand within the glass industry. The machinery manufacturer is today represented by three business units: Tableware, Tubes & Lighting, and Technical Glass. Each of these business units is made up of a team of specialist engineers. This enables the company to offer its customers technical solutions designed to create synergies with their production strategies. ■

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Sklostroj Turnov CZ

Sklostroj Turnov CZ s.r.o., Czech Republic

Operating Efficiency from a Single Source

The Czech company Sklostroj Turnov CZ s.r.o. has more than 60 years of experience in manufacturing systems for container glass production and owns one of the world's most modern IS machines. All pneumatic axes have been replaced with Simotics S-1FK7 and S-1FT6 servo-axes. The result is a highly compact and flexible machine. Thanks to its versatility, it can be operated as a single-gob machine (with 4 stations) or as a high-performance quad-gob machine (12 stations). The control and technology tasks are handled by a Simotion D445-2 CPU with Sinamics S120.

Hardware and software that further significantly increase availability and productivity are also part of the new machine. The Sinamics S120 active line module represents a significant development for worldwide application, as it not only enables mechanical energy from the motor to be fed back to the power supply network, but also compensates for fluctuations in the mains supply. ■

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ghs | glass GmbH

A Competitive Edge through Knowledge

ghs | glass GmbH of Dresden has established itself as a high-performance glass industry partner in a very short time by offering engineering and solution expertise "made in Germany." Led by company founder and CEO Herbert Köhler, the group of engineers and technicians with many years of experience in glass furnace construction and other areas of the glass industry is looking to greatly expand the company's business in the coming years. The team has many years of experience in engineering and glass furnace technology, in project engineering, and in project management, as well as in the operation of flat glass plants.

Many developments are based on the technology and expertise of Siemens, according to Köhler: "We appreciate the high level of competence of the Siemens engineers as well as the flexibility to react to customer requirements. Together with other partners, this gives us the required edge over the competition." Siemens is an ideal partner for ghs | glass not least due to its excellent reputation and worldwide presence. Köhler continues: "We cater to our customers and develop tailored solutions. We rely on products and solutions from Siemens, since these systems correspond to our high

standards and, together with our expertise, give our customers the ability to be leaders in efficient energy use and environmentally compatible solutions in the glass industry – without making compromises in terms of glass quality." ■

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www.ghs-glass.de



"We appreciate the high level of expertise of the Siemens engineers as well as the flexibility to react to customer requirements."
 Herbert Köhler, Founder and CEO, ghs | glass GmbH

Siemens AG | W. Geyer

Glass market trends

The Glass Market in the United States

After several years of stagnation and market contraction, the climate in the glass market in the United States has now improved. There is considerable growth, driven by demand from the construction industry as well as from consumers. John Salkas, glass industry manager for Siemens in the United States, emphasizes in an interview that companies now need first and foremost to make improvements to their processes. He is convinced that the positive market developments can only be harnessed with the best technologies and the corresponding knowledge. ■

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Solar market trends

The Solar Industry in the United States

The market for solar energy is the industry with the fastest growth in the United States, offering a diverse range of opportunities for companies, says Karen R. Bean, head of Vertical Segment Solar, Siemens USA: "Key issues for the solar industry are time to market and efficiency in production. It is important that the solar industry in the United States makes use of the knowledge that is already out there and chooses the right partners for implementation of their business strategies." ■

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glass and solar online

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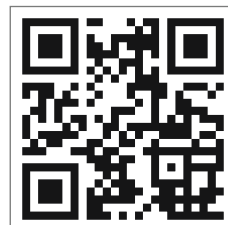
motion world for the iPad

The English-language motion world, our magazine for CNC automation, is also available for the iPad. The iPad magazine combines the contents of the print edition with multimedia and interactive features. Through additional videos, animations, slideshows, and much more, you get further background information on the current trends and technologies relating to all aspects of Sinumerik and can enjoy reading the magazine even more.

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You can find more information on our website:

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motion world for the iPad

Scan the QR code with your iPad and download the motion world app directly.

The Siemens logo is displayed in a teal, sans-serif font. It is positioned in the upper left corner of the advertisement, set against a white rectangular background. The background image of the entire advertisement is a close-up of a person's hands holding a thin, transparent glass panel over a complex industrial machine with various mechanical components and yellow safety railings.

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