

GlassFocus

The Magazine for the Glass Industry

2010

SIEMENS

Well Equipped for the Future

New technologies for innovation and energy efficiency



Fotofrieder

Innovations are key to meeting future challenges

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**Rolando Haro
Gonzalez**
Business Development
Automation of
Glass Machines

Dear Readers:

Glass is one of the world's oldest materials – and yet there is always a new edge to it. New technologies in glass production and processing give glass custom properties that make it suited for even the most demanding applications. This means that instead of “just making glass,” the glass industry produces a wide range of highly differentiated products. Companies are therefore changing and expanding into and through the glass production process chain. New plants are now more flexible as well as more efficient – especially in the important areas of energy and resource utilization. With our products, systems, and solutions, we want to support our glass industry customers not only in successfully meeting today's challenges but also in preparing for future requirements. That is why in this 2010 edition of *GlassFocus* we are highlighting technologies that were specifically developed for innovative glass products and for improving energy efficiency. For example, the report about f | glass GmbH shows how we worked together with partners to equip one of the most advanced glass production plants with automation and drive technology. The small footprint of our highly efficient turbines allows effective and process-compatible energy recovery in glass production. Drives with infeed technology and energy-efficient motors result in significant energy savings for glassmaking machines and equipment, so this technology has a short return-on-investment period. At the same time we enable customers to further improve the quality of their products and to more flexibly respond to market requirements. You will find several examples of these innovations in this issue.

We hope you enjoy reading the 2010 edition of *GlassFocus* and that we will give you some valuable ideas.



- Innovation and energy efficiency in the glass industry

Well Equipped for the Future

Innovations are key in today's glass industry. At Glasstec 2010, the industry's premier companies are showcasing new technologies and processes in the glass manufacturing sector. The main focus is on efficiency and enhancing performance, especially in terms of how well the environment is protected.

Glass as a material has become a permanent fixture in our everyday lives. Whether container glass such as for bottles or jars; or high quality float glass for automotive use, construction, interior architecture, and photovoltaic plants;

or in specialized applications such as fiberglass, glass has conquered all areas of our lives. Although the basic material has been the same for some 5,000 years, in recent years the demands made of production processes have undergone dramatic changes. By



Fotofinder

refining production recipes and special production methods, researchers and engineers have managed to turn glass into a high-performance product. Coatings play an important role in this regard. Coatings give glass dirt-repellent and even self-cleaning characteristics, giving glass higher light transmittance, heightened mechanical resistance, and resilience against corrosive substances.

A challenge and an opportunity: diversification

Just as glass products have evolved, so too has the glass industry itself. Manufacturers produce not just one specific type of glass but a wide variety, often at a single factory. This development requires greater investment by manufacturing enterprises. At the same time, costs for raw materials and energy are on the rise. This means the glass industry is faced with two challenges: on the one hand, market demand must be met, and on the other, cost control must be exerted. And lawmakers and the general public are also requiring proof that production is not harmful to the environment. In order to save resources and preserve the environment for later generations, the glass industry has to go "green."

The key to this is innovation. By introducing new technologies, glass manufacturers can implement their processes more flexibly and more efficiently, improve their product quality, and reduce their consumption of resources. In order to help manufacturers meet these requirements, Siemens works closely with glass manufacturers and mechanical engineering specialists to offer a comprehensive portfolio of products and systems for automation solutions, process instrumentation, analytics, and drive technology for glass manufacturing.

Energy-efficient production...

Over 75 percent of the energy required in glass manufacturing is consumed during melting. The burners are fired with oil or natural gas, and furnace efficiency depends on the quality of the fuel used. Using Sitrans CV, gas quality monitoring through chromatographic determination of the calorific value allows the burning process to be optimally managed within the process control system. This system ensures that the exact amount of natural gas is being fed in, significantly reducing fuel consumption. This additionally results in a more stable burning temperature as well, which extends the service





The glass industry thrives on innovation: The spectrum of new developments ranges from fiberglass production to safety glass for the automotive industry...

►► life of the furnace and considerably improves glass quality. The melting process also generates an enormous amount of waste heat that until recently was not sufficiently exploited. By deploying a new, compact Siemens steam turbine, up to 95 percent of the energy consumed can be recovered (see p. 8). Not only does that save money, it also reduces carbon dioxide emissions.

...using energy-saving motors and converters

As in many other industry sectors, there is also a trend in the glass industry to consider not only initial investments but also the total cost of ownership (TCO) over the entire life of machinery and plant equipment. For example, the share of energy costs for motors is often well over 90 percent of TCO. Equipped with energy-efficient motors and converters, Siemens energy-saving drive systems make a big difference to the cost picture, especially in large float-glass processing equipment. Electric drives already consume two-thirds of the electricity required by industry – that is why greater efficiency in this area is so effective.

As of June 16, 2011, two-, four-, and six-pole motors may only be used in the 0.75- to 375-kilowatt performance range, with minimum efficiency equal to or better than IE2. Siemens is ahead of its time and has already met the IE2 efficiency standard by increasing motor efficiency by 2 to 9 percent. With total efficiency of over 90 percent, the technology breaks even after only one year.

As is also true for other industry sectors, Sinamics converters play a significant role in the glass industry because their use offers considerable energy-saving potential. Adjustable-speed drives with frequency converters are used primarily for glass conveyor drives as well as in furnace and annealing lehr fans. These drives perform very well in these

scenarios because equipment does not operate at a constant speed, meaning the speed and thus the energy consumption must be rapidly and precisely modified to reflect momentary requirements. Depending on the plant's characteristic consumption curve, savings can be as high as 70 percent.

A second key aspect is the opportunity for energy recovery. Sinamics frequency converters recover energy released during braking and feed it back into the power supply network, making it available to all power-consuming devices. This eliminates the need for braking resistors that generate heat loss. Many frequency converters with energy recovery capability are also able to ensure that there is no phase shift between voltage and current; this prevents reactive power from being used from the network, which otherwise would be a cost factor or would have to be reduced by using reactive power compensation equipment.

Regardless of the energy-saving products, there is also significant savings potential in the configuration of drives. The SinaSave software tool allows the amortization period to be calculated for drives so that the manufacturer can determine the most economical solution for the customer's needs.

Optimizing energy consumption

Sophisticated technology is only one of several possibilities for reducing the level of energy consumption in glass production. To increase energy efficiency in a sustainable manner, plant work processes must be modified. Energy management systems are therefore an essential factor in optimizing a company's energy efficiency. Siemens offers an energy optimization concept for this area based on a holistic view of company processes (for a detailed description, see p. 12).

Another tool for efficient energy management is



...all the way to solar collectors and high-quality coatings for building glass

called b.data. This energy management and company information system creates transparency by breaking down energy consumption and materials seamlessly so that energy costs can be charged to the correct party and transferred to an invoicing system. The characteristic values established in this way make possible well-founded statements on efficiency improvements and thus allow users to manage energy operations in an optimal and economical manner in controlling, planning, and energy procurement.

Meeting high quality standards

Glass is a highly advanced material whose functionality and areas of use are constantly undergoing further development. More and more diverse types of glass are being called for in the automotive sector, and the glass must also satisfy the most demanding safety and comfort requirements.

The market for solar collector equipment is booming, driving demand for cell-based and thin-layer photovoltaic panels. The solar industry has very stringent requirements for durable glass grades with low iron content for use under the most demanding weather conditions. In addition, solar applications such as concentrated solar power (e.g., Desertec) offer a wide range of uses for solar glass as parabolic reflectors and receivers through which a heated medium flows. This heat is then used to generate electricity using Siemens steam turbines.

As requirements for various areas of application have grown more and more demanding, requirements for consistent quality have increased as well. Whether high-quality tableware glass, Ceran® glass-ceramic cooktop panels, composite safety glass for car windshields, or glass for solar panels, flawless final product quality depends on highly advanced automation solutions, process instrumentation, analytics, and drive technology. Siemens offers products and

systems for the glass industry that are perfectly geared to one another. The key to optimizing a company's entire production process – from product quality all the way to energy efficiency – is found in process control. With Simatic PCS 7, a powerful process control system is available for processing manufacturing data. Products for process instrumentation (Sitrans instruments for measuring pressure, temperature, filling level, flow rate, etc.) enable a stable production process and thus high glass quality. The use of Simotion in IS machines guarantees smooth infeed into the machine and consistent gob sizes, not only allowing perfect results in container glass but also effectively utilizing expensive, energy-intensive raw materials. Innovative plant equipment automation with new Profinet functions substantially reduces the amount of hardware and engineering required for safety-oriented tasks in the plant. This product offering is rounded off by user-friendly engineering solutions that make plant configuration easy. Going beyond this, customers receive services throughout the lifecycle of their equipment – from planning and commissioning all the way to modernization and maintenance.

Thanks to efficient and high-performance automation solutions, glass manufacturers can make better use of resources and respond to market requirements with greater flexibility. Plus, glass industry players can then devote their time to their core competencies by including the expertise of a partner such as Siemens. This allows the glass industry to develop further groundbreaking innovations so that the fascinating product of glass can continue to play an important role in our lives. ■

info

www.siemens.com/glass

- Steam turbines for the glass industry

Recover Waste Heat – Save Energy – Protect the Environment

Small, flexibly deployable Siemens steam turbines convert waste heat from the glass production process into other forms of energy such as electricity, heat, and steam at a very high level of efficiency.



Energy recovery is one of the key issues of our times. It involves both efficiency and environmental protection. The glass production process creates tremendous amounts of waste heat, which is too valuable to simply be released through a stack. Steam turbines convert this waste heat into electricity via waste heat boilers.

Flexibility for partial- or full-load operation

The product being manufactured is always the focal point. This is why waste heat recovery must not have any negative impact on the production process. Siemens Turbomachinery Equipment GmbH specializes in industrial steam turbines with output from 45 kilowatts to 10 megawatts and whose most important characteristic is their extremely flexible construction. This flexible approach ensures optimal customer-specific configuration, ease of integration into the waste heat recovery process, and rapid assembly. At the same time, investment and subsequent maintenance costs remain low.

It is the flexibility of turbines that is of vital importance in the glass industry. The volume of the extracted air from the glass production process increases over the glass furnace lifetime. The turbine must be capable of processing the corresponding increasing steam volume with a load range from 50 to 100 percent. A nozzle group control for the high-pressure and condensation turbine ensures optimum efficiency even when under partial load. The monitoring and control is carried out via a Simatic S7-400 controller, which is individually programmed and connected with a higher-level control system via Profibus. This allows the steam turbine to be monitored and controlled from both the central control room and on-site from the turbine's own operating panel. Siemens also supplies the entire master control technology, so the customer can rely on just one source.

A high level of specialization

More than 90 percent efficiency can be achieved overall if the steam is used not only for generating electricity but also for other processes via combined heat and power (CHP) units, as well as for heating water or for air-conditioning with absorption-type refrigerating systems. Depending on the infrastructure, the heat energy can also be fed back into the municipal district heating grid or supplied to nearby companies. This shows that many factors must be considered that go beyond the confines of the site if plant equipment is to be effective. That is why full installation, from working out the overall concept all the way to implementation, can take two to three years. Many experienced specialists must pool their knowledge. For this reason, Siemens relies on respected partners for boilers, pipework, buildings, and utilities.



Compact, modular steam turbines can be configured for specific customer requirements

ROI within a few years

The breakeven point for a steam turbine at a medium-sized float-glass plant is typically just a few years, depending on production volume and local energy prices, but it is particularly dependent on the design layout of the overall plant. The fees paid for electricity and heat fed into municipal utility grids, subventions for CHP plants, bonus payments for renewable energy, and rebates on mineral oil taxes can help attain return on investment (ROI) sooner.

However, waste heat recovery is not exclusively a financial issue, even if the motivation to recover energy may be largely monetary. Statutory provisions will soon be passed according to which new facilities will only be approved if CHP plants are included in their design. At the beginning of 2009 the German parliament passed an amendment to the CHP law. This new legislation is intended to increase CHP generation in Germany to 25 percent by, among other measures, promoting the modernization and new construction of CHP plants as well as the new construction and extension of district heating grids into which heat from CHP plants is to be fed.

Entering the international glass market

In the German glass industry, Siemens has already successfully deployed several industrial steam turbines, such as at newly built flat-glass and solar-glass manufacturing plants. Depending on the plant operations, the waste heat is either used for generating electricity or part of it is devoted to process heat, heating, or cooling. The political landscape and economic developments have great influence on energy prices and the requirements for carbon dioxide emissions reductions, and they can change rapidly from country to country all over the world. In the years to come, Siemens plans to play a stronger role in supplying the glass manufacturing industries of neighboring countries and is also preparing to enter other markets around the world. ■

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■ UAS Messtechnik GmbH, Germany

Success Based on Innovation and Flexibility

Thanks to its entrepreneurial spirit and innovative strength, UAS Messtechnik in Viechtach, Germany, has been achieving double-digit growth for years. The Simatic system integrator is a certified Siemens Industry Partner.

The Bavarian Forest region of Germany has a long tradition in glassmaking and is home to some of the world's oldest glass plants. This is also the location of UAS Messtechnik GmbH, a 25-year-old family-owned business. With exports accounting for 60 to 70 percent of orders, UAS is one of the glass industry's most dynamic suppliers and partners. Its technology portfolio ranges from the planning and implementation of complete plant control systems to cutting-edge technologies for energy-efficient, environmentally friendly glass production.

A technology pioneer

Since the very beginning, one of UAS's core strengths has always been technology development. Compared to conventionally fired furnaces, the company's oxy-fuel systems for firing glass furnaces with oil or natural gas combined with pure oxygen achieve better glass quality, consume less energy, and reduce particulate and nitrogen oxide (NO_x) emissions by up to 70 percent while also cutting carbon dioxide (CO₂) emissions by as much as 60 percent. UAS has continuously developed its software and hardware for the related process and control technology, giving the company a clear

competitive edge. Its solution has become a de facto industry standard for high-precision control of fuel-oxygen mixtures. The UAS oxy-fuel technology with a Simatic S7 controller for gas processes and safety technology is TÜV certified and complies with the most recent German DIN standards.

Additional examples of UAS's performance capabilities are its low-NO_x technology for reducing nitrogen oxide in conventional furnaces by as much as 30 percent, smoothing off carbon monoxide (CO) peaks, and allowing lower energy consumption, and Optomess, an optical probe system for monitoring and optogeometrical scanning of the interior surfaces of furnaces for signs of wear during operation.

Shared success through co-development

Fifteen years ago, UAS and Siemens found themselves regularly crossing paths at the same customers' facilities and realized they were pursuing the same ideas and objectives and carrying out the same tasks. The common denominator was control processes in glass production. The two companies initiated their collaboration in 2006. Today UAS is a certified Siemens Industry Partner. This collaboration has resulted in new technologies and industry



Photo: UAS

Solution Partner

Automation

SIEMENS

standards. The combination of excellent process knowledge, the most up-to-date technologies, and global sales networks has created a classic win-win scenario.

In 2007 UAS implemented the first TFT (thin film transistor) glass line in China. The Viechtach-based specialists are currently equipping five greenfield TFT line plants with the very latest measuring and control technology. From its oxy-fuel systems for melting furnaces to the DHPS (Direct Heated Platinum System) all the way to its annealer, UAS is setting new standards with innovative PCS 7 technology.

Reductions in pollutant emissions and energy conservation and recovery are the important topics of the future that UAS is intensively pursuing together with Siemens. In the coming years, expansion of international business will be on the agenda, in particular in the area of TFT LCD glass. ■

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www.uas.de



Entrepreneurial spirit – it runs in the family

The UAS story begins back in 1984 when Bernd Donaubaauer, a master technician specialized in process, measuring, and control technology, founded Ultrakust Anlagen und Service GmbH in the Lower Bavarian city of Ruhmannsfelden as a subsidiary of Ultrakust Gerätebau GmbH & Co. KG. At Schott-Zwiesel he learned from the bottom up how to melt and shape glass. In 1988 he acquired all the shares of the subsidiary and founded UAS Messtechnik GmbH. Donaubaauer has made a name for himself in the industry with his philosophy of innovation. Since 2002 the company's headquarters have been located in Viechtach, about 30 kilometers from the glass-making stronghold of Zwiesel. Thomas Donaubaauer succeeded his father in 2006 and has shared the role of company president with Franz Knopf since 2010. Bernd Donaubaauer continues to share his extensive industry experience with UAS in an advisory role.

In recent years the company has enjoyed continuous double-digit growth. The financial crisis had no effect on this expansion. Today, UAS has a workforce of 30 employees and in 2009 posted revenues of €5 million. When asked about the secret behind the success of UAS, Thomas Donaubaauer explains: "We are aware of our strengths and our potential. As a family owned and operated company in its second generation, we uphold a tradition that is not only ours but also an integral part of our glassmaking region, and we ensure that our employees always have the very latest expertise. We know that innovation requires creativity and the ability to anticipate the future, and so we create just the right working conditions to enable this. With these prerequisites in place, we are able to achieve a high degree of flexibility, which today is more important than ever, because it isn't the big companies taking over the small ones – it's the fast ones swallowing up the slow ones."



From left:
Stefan Donaubaauer, Bernd Donaubaauer, Thomas Donaubaauer, Franz Knopf

■ Energy optimization

Energy Health Check for Industry

Increasing energy efficiency lowers costs and reduces harmful effects on the environment. The energy optimization concept by Siemens also ensures plant sustainability. It is founded on holistic process analyses and assessment of a company's energy balance sheet.

Energy optimization in three phases

Analysis phase

This phase takes stock of the facility's general condition in terms of energy efficiency. In the process, all forms of energy, energy supply and distribution, and energy data collection and archiving, as well as energy by-products such as waste heat and greenhouse emissions, are analyzed and assessed. With this baseline information an estimate is made as to how much energy can be saved, including the measures and capital spending required.

Feasibility phase

Individual measures identified during the analysis phase are selected. These are evaluated based on thorough calculations and measurements in order to determine the energy savings to be expected. The outcome of this phase is a detailed technical and economic feasibility study that includes both a detailed breakdown of annual energy savings and a detailed implementation concept.

Implementation phase

The measures are implemented with selected partners.

Siemens has developed a three-phase concept for sustainable energy optimization that is founded on a holistic technical and economic consideration of the production process. All key auxiliary processes such as the utilization of process heat, steam, or cooling are taken into account as part of the analysis. Only the overall balance sheet of all forms of energy (electrical, mechanical, thermal, etc.), together with the primary source of energy used (oil, natural gas, electricity, water, etc.), can bring the whole truth about energy to light and thus allow an objective and realistic assessment of total energy consumption and efficiency. Based on this assessment it is possible to identify and calculate suitable measures and step-by-step energy optimization. This creates security and cost checks for the ensuing technical and organizational implementation. This continuous improvement process adds value at each stage in the process. Against the backdrop of the demonstrated potential for energy savings and the calculated return on investment, it is then possible to make a decision on whether to implement the next measure and, if so, when.

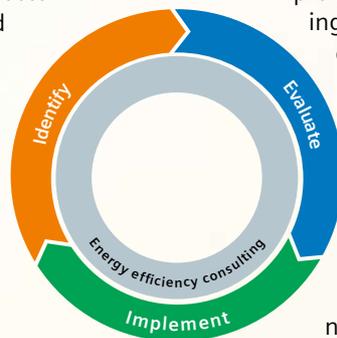
Energy Health Check reveals areas for improvement

The analysis and evaluation of the energy efficiency achieved in operations begins with an Energy Health Check based on a computer-supported interview lasting two to four hours. Interviews with management review and compare all the energy-related operational procedures and management processes as well as their organizational structures. The objective is to pinpoint promising approaches, identify areas having energy-saving potential, and provide initial recommendations on suitable actions. The

responses given in the interview are evaluated using a special analysis tool, sorted by category and issue, and rated on a scale of 1 to 5. After this comes an industry-, country-, and sector-based comparison of the results using a database containing data from over 2,400 enterprises or facilities that have already undergone an energy review.

Ensuring continuity and raising awareness

To be successful in the long run, energy management must be sustainable. Adopting superficial improvement measures or rapidly implementing individual components and devices only achieves short-term energy savings. Over the medium and long term, these measures may incur incalculable costs. However, the Siemens energy optimization concept creates an effective and reliably calculated plan for enhancing energy efficiency based on high standards of quality that takes economic and technical aspects into consideration, ensures short amortization periods, and can be continuously implemented. It is this continuity that is especially crucial for sustainability. In order to have long-term success, energy management must be a regular part of daily operational routines. It is thus an important task for management to raise the awareness of employees about this task and to proactively include them at an early stage in implementing the energy optimization concept throughout the company. ■



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■ f | glass, Germany

Setting Industry Standards

The new f | glass plant is one of the world's most advanced and energy-efficient float-glass production units. Siemens technology plays a decisive role in the plant's success.

After successfully beginning production in the fall of 2009, f | glass GmbH in Osterweddingen, Germany, now produces up to 700 tons of float glass a day. The stockholders of f | glass are the Dutch glass industry specialist Schreiner Group and Germany's Interpane Industrie AG.

The joint venture's float-glass plant sets industry standards in several ways: not only does it lead the way in terms of process and plant technology, the production plant also stands out for product quality and construction time. It took only 15 months from groundbreaking to the start of production – quite an accomplishment according to f | glass GmbH's CEO Herbert Köhler, who was involved in project management right from the start. "Clear objectives are decisive for that kind of project," he says. "That is why we set a fixed date for beginning production. And we wanted to meet the deadline while staying on budget. We managed to do both." Dr. Ing. Wolfgang Rübiger, chief technology officer at f | glass, adds: "Within a very short period of time we built a fully integrated solar-glass production unit that allows a relatively new product – a very low-iron glass designed specifically for the solar industry – to

be manufactured at one site: from the float-glass unit to the cutting lines and the coating of large-format glass sheets all the way to our solar-glass center."

Technology "made in Germany"

There is a technological highlight right at the beginning of the process: the glass furnace, a regenerative cross-fired furnace with six pairs of gas-fired burners. Rübiger played an important role in the development of this furnace. "Our goal was to build a furnace that is able to do just about anything. It was supposed to be able to melt normal glass, white glass for construction, and solar glass, but also consume as little energy as possible and have a long service life," says Rübiger. The previous furnace, also co-developed by Rübiger, was in operation for 16 years. "I am certain that the new furnace will be in service for 20 years," he predicts.

Nearly all the other equipment for the plant was supplied by German machine and plant equipment manufacturers. For Dr. Thomas Belgardt, managing director of glass processing at f | glass, supplier quality is decisive. "In this regard, it is not just about



The exhaust gas treatment system at f | glass GmbH



A true gem: the control room

the technology being delivered but also about a long-term partnership. After all, in 10 to 15 years we still want to be able to rely on competent support. That is why we always select market-leading suppliers."

Highly advanced energy recovery and reliable control technology

One of the project partners was Siemens. The company supplied automation technology for the plant and the turbines for energy recovery. Osterweddingen is one of the first glass plants in the world to recover a large part of the process waste heat using a modern heat recovery system. The system's most important component is a compact Siemens industrial steam turbine with a rated capacity of 2.5 megawatts, which f | glass uses to generate electrical energy from the waste heat in the process exhaust air. The energy recovery system not only saves energy, but, according to Rübiger, "the energy recovery process also helps ensure process security. By producing 60 percent of the electricity required for the float-glass plant ourselves, we are better able to cope with a power outage, for example."

The control technology system in Osterweddingen, which is based on the most recent version of Simatic PCS 7, was implemented by Siemens Industry Partner STG. The system is operated via five Simatic WinCC clients, an engineering station, and a web server. The operating level is connected to the two redundant control system servers via Industrial

Ethernet. The system bus is also based on Industrial Ethernet. The furnace, float bath, and annealing lehrs are each controlled by a dedicated PCS 7 AS 416 automation system. Visualization of the top rollers as well as the electrical and control technology systems is also integrated within PCS 7. Reversal switching is redundant and is controlled by the furnace automation system and a lower-level Simatic ET 200M of the automation system in the float bath. "We are very satisfied with the technology being used," says Rübiger. "The constructive and committed approach demonstrated by the Siemens specialists as they supported us in solving problems was excellent, as was the professional and successful implementation of the project."

Optimally equipped

Gross output at f | glass is currently 255,000 tons of float glass per year. At the beginning of 2010 the Magnetron coating line began production and is coating around six million square meters of glass a year – or more upon request. Around 80 percent of the production output is shipped to the building construction sector; however, in the next five years the share of ultrawhite glass and solar glass is to be increased to approximately 50 percent. Thanks to its high-performance production technology, Osterweddingen is optimally equipped for the job. ■

info

www.f-glass.de

■ Interpane, Germany

“Demand Will Continue to Grow”



Born in 1941, Georg F. Hesselbach, who holds a degree in business management and has a commercial and technical background, has led Interpane to the forefront of the global glass-manufacturing industry over the course of the company's 40-year history. We spoke with him about the key milestones in the company's history.

Mr. Hesselbach, you founded Interpane because you needed insulating glass for your house, right?

Hesselbach: Yes, that is exactly how it happened. In 1967 I was building my own house and wanted to install insulating glass in our living room, and at the time insulating glass was very costly. Back then I discovered that there was no way of obtaining insulating glass quickly on the market. Interpane evolved from this situation. In 1971 I started my first company with 10 employees. Today there are 11 production sites with a total of 2,000 employees working in glass manufacturing and mechanical engineering.

At the same time you have constantly expanded your portfolio.

Hesselbach: Over the past 40 years the glass product has changed dramatically, including a complete transformation in the level of glass quality. Earlier there used to be only simple, drawn building glass. Today there is insulating glass, safety glass, fire protection glass, sun protection glass, solar glass – and the list seems to just go on and on. We developed as the product evolved, and even came up with new products ourselves in our business fields of glass technology, glass coating, customized cutting lines, logistics, and transport systems. We continue to play a leading role in this regard.

Can you also say that your company progressively penetrated the glass products sector?

Hesselbach: In a sense, yes. From the finished insulating glass product we proceeded in reverse through the process chain: from processing to finishing, from transformation to coatings, and then one step further into glass melting and production.

Today we are fully integrated within the entire glass process and also have plants for highly specialized glass – from the melting process all the way to final delivery, like at f | glass.

How has glass technology changed over the years?

Hesselbach: That can be nicely demonstrated using the example of our vacuum coating technology. We originally purchased the first unit for 2-by-3-meter sheets of glass. Then we developed the second unit ourselves, which allowed us to coat 3.20-by-6-meter sheets of glass with a capacity totaling 450,000 square meters. This was then increased to 600,000 square meters. Then a twin plant was set up. The next generation consisted of continuous processing units having a capacity of 4 to 5 million square meters. Today we build plants that can coat 8 to 10 million square meters of glass sheets measuring 3 by 7 meters in size.

And what will the next step be for you?

Hesselbach: I am certain that after the tremendous growth in high-grade glass experienced in Germany and Europe, there will be similar growth in the global market. Heat-insulation glass makes an important contribution to conserving energy. We can do our part in this area with Interpane. As for myself, in the future I want to have more time for my family and my hobbies of theater, music, and cooking, and also to pursue sports such as skiing, golf, and dancing.

Mr. Hesselbach, thank you for sharing with us.

info

www.interpane.com

■ **Elettromeccanica Bovone S.r.l., Italy**

A Perfect Fit

The Italian company Bovone develops customized total solutions for the production of laminated safety glass with an intelligent Simatic controller.

The requirements for specialty glass in industry are growing constantly due to increasing demands for energy savings and safety. The glass manufacturing company Bovone S.r.l., founded in 1954, makes laminated glass systems that can be perfectly adapted to customers' requirements thanks to their modular structure. The systems for glass widths of 1,600, 2,200, 2,600, and 3,300 millimeters can be built up in rows or U-shapes as required.

Efficient washing and drying process

The glass panels are first loaded into a feeding station with loading axes, where a swivel arm tilts them from the vertical into the horizontal position. The speed of the feeder can be increased by an accelerating conveyor to reduce the distance between the glass panels. The glass panels are washed and dried to prepare them for the lamination process. Three pairs of air knives and an electric fan fitted to its own frame above the glass line ensure quick drying. To ensure rapid and easy maintenance, the upper section can be lifted 500 millimeters by a supporting motor. The upper roller barrier and the air knives can be adapted automatically to the thickness of the glass. The operator controls the entire process with the small but very efficient Simatic TP177B touchscreen.

Perfect alignment ensures optimum lamination

With precision control, the transfer station feeds the glass sheets into the assembling station, and then the appropriate foil is fed in and cut automatically. In the next step the glass sheets are positioned in

perfect alignment. Extremely high accuracy and precision are possible thanks to the front and side edge alignments. The sophisticated bench design also allows easy handling of even the smallest glass formats.

An optimally controlled furnace and pressing station consisting of a first furnace and press and a second furnace and press is crucial for a good lamination result. Each infrared lamp into the furnace can be controlled individually by a Simatic CPU S7-315. The furnace data are managed by Simatic Panel MP 277. The energy-saving heat control process developed by Bovone is implemented with a Simatic S7-315. The pressure of the pressing rollers can be set exactly to the specifications for the glass package from the operator panel. After leaving the second press, the plates are moved from the horizontal to the vertical position by an unloading device with a loading axis and swivel arm controlled by Sinamics S120, placed on transport carriages by grabbers, and conveyed into the autoclave. There the glass becomes completely transparent due to the prevailing temperature and pressure conditions.

All the devices can be controlled at all times via Profibus, thus ensuring maximum efficiency in the event of a fault, both during installation and production and during tests at Bovone and on-site at the customer's facility. ■

info

www.bovone.com

The transfer unit with suction cups picks up the glass from the squaring table and places it on the assembling table



The new music hall in Moscow with Guardian performance glass



■ Guardian, Russia

Local Connections

Guardian Industries, one of the world's largest manufacturers of float glass and fabricated glass products, looks to Siemens' local expertise when building a plant in Russia.

Founded in 1932, Guardian began as a small windshield fabricator in Detroit, Michigan. From these humble beginnings, Guardian has grown and diversified to achieve a global presence, now with over 19,000 employees in 21 countries on five continents. Guardian credits its growth to an efficient management approach and its focus on innovation.

Guardian saw great potential for more growth in the city of Ryazan. Located in the western quarter of Russia, and relatively close to Moscow and Russia's western and southern borders, Ryazan has access to plentiful natural resources and inexpensive power, yet geographically can serve markets in Europe and Asia as well as in Russia.

Ryazan's urban and geographic features make it an attractive manufacturing site. But the Russian market has special requirements that must be carefully considered. Russian regulations demand that the building and running of any such factory employ mainly Russian labor, and there are also GOST standards for utilities and other factors that must be met, not to mention the language barrier. It's also very important that maintenance services and technical support for the intended plant be available locally, since naturally the plant will be in use for quite a long time.

Siemens paves the way

With over 150 years of experience doing business in Russia, Siemens has the expertise and Russian manpower needed to bridge any international divide presented there. And with such a long track record in Russia, it's a certainty that Siemens support will still be available and close by many years from now.

Siemens is a proven solution provider, having an excellent reputation not only in Russia but around the world. Guardian was well acquainted with Siemens quality, having used a Siemens solution with great success at its facility in Ras Al Khaimah.

Because of Siemens' local presence in Russia, allowing local support in years to come, as well as Siemens' quality, know-how, and price competitiveness, Guardian naturally turned to Siemens to provide a solution when building a new greenfield float-glass manufacturing plant in Ryazan.

The Siemens solution

Guardian requested that Siemens provide electronics and controller packages mainly for the hot-end part

of the float glass process. To ensure low installation cost and reduce installation commissioning time, as well as provide flexibility, Siemens used the following systems: Drive cabinets with Sinamics S120 drive technology were used for the top rollers, lehr drive, fans, and batch charger. The Sinamics S120 is a modular system for high-performance application, and includes individual AC/AC drives as well as

Key points

- ▶ Guardian wanted to expand its global presence in Ryazan, Russia.
- ▶ Siemens' established presence and expertise in Russia, combined with its know-how and quality, led Guardian to choose Siemens as its solution provider.
- ▶ Guardian's trust was well placed, as the Siemens solution was commissioned quickly and has performed flawlessly ever since.

coordinated DC/AC drives for multi-axis applications. For the bath and lehr heating, a complete set of Siemens cabinets was used, together with the power controllers of a partner supplier.

An S7-400, Siemens' most powerful PLC, was the basis for the control system for the furnace and bath/lehr. This was combined with Simatic ET 200M and Simatic ET 200S distributed I/O systems. The ET 200M is used in control cabinets with high-density-channel applications and the ET 200S has a bit-modular design to enable multifunctional use of the station. Through a system integrator (NATUS), Siemens also delivered low-voltage switchboards to cover the power supply needs for the new factory.

Solution implementation

Guardian's trust in Siemens was well placed. Siemens commissioned its part of the plant quickly and the controls have performed flawlessly since. The Siemens solution and local support will allow Guardian to operate its plant reliably and economically in the growing glass market in Russia, Europe, and Asia. ■

info

www.guardian.com

■ Grenzebach Maschinenbau GmbH, Germany

Innovative Line Automation

By upgrading to the universal and future-proof Profinet Industrial Ethernet standard, the engineering specialist Grenzebach Maschinenbau has just the right equipment to meet demanding requirements in the float-glass industry.

Grenzebach Maschinenbau GmbH offers material logistics and processing technology solutions for the glass and construction materials industry and also develops plants for the manufacturing of solar panels. Since the mid-1970s, the company based in Hamlar, Germany, has developed and built machines and plants for cold-end float-glass production, covering essentially all process steps following the annealing lehr, all the way to warehouse storage. Because of the high product quality that can be achieved in this process, nearly all flat glass made today is produced in the float process. The so-called cold end of a float-glass plant comprises receiving and transporting the glass ribbon after annealing, cutting and breaking it into sheets, and stacking finished sheets for storage.

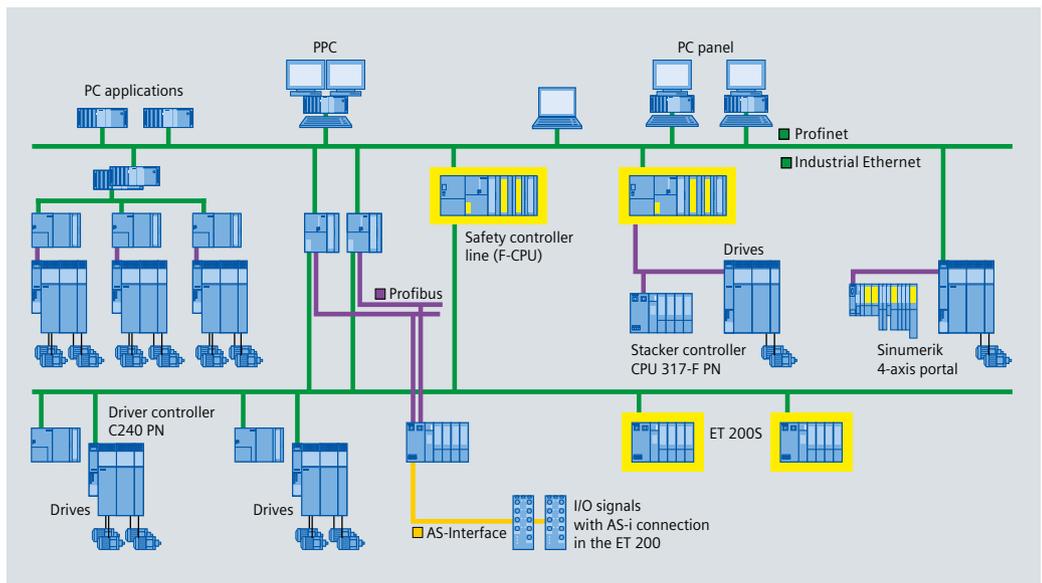
Consistently high product quality

The glass ribbon is transferred to the material handling equipment at the end of the annealing process. From there the glass is conveyed to the cutting area so it can be cut to a specified size. While measuring wheels check the speed of the moving glass ribbon, camera inspection systems above the production line monitor glass quality and provide information on defects (bubbles, traces of tin, etc.). The edges of the glass ribbon are measured by a camera system developed by Grenzebach. The information collected in this way guarantees a trouble-free production process and allows errors to be identified at an early stage.

A control system keeps track of customer job orders and generates the manufacturing data such as sheet size, quality, storage location, and number of sheets per stack frame. These data are shared with the optimization PC. Cutting patterns created on the PC are transferred by the optimization PC to the cutting line. The optimization of the cutting patterns ensures that as little refuse glass as possible is left over as cullet.

The adjustment conveyor breaks the rounded edges of the glass sheet off along the longitudinal axis

Grenzebach leads the way in plant automation with its float-glass line architecture



Based on specified data, the cutting machines move their cutting wheels across the glass ribbon and score grooves along the direction of movement as well as at right angles. The glass is transported to the snapping rolls so the glass can be snapped along the scored lines. Before subsequent processing, the marks left by the top rollers are removed from the sheets. Shock rollers trim the glass edges. The cullet is transferred back for remelting. Conveyors transport the custom-cut glass sheets to the stacking devices.

Redundant control of the transport line

In order to ensure high availability in the cutting area, the heart of the Grenzebach float-glass line, redundant Cutting-Master controls communicate with Simotion controllers via Industrial Ethernet. The axis control via the Simotion system helps attain a high degree of precision based on an exact position control cycle and the highest repeat accuracy. Control of the feed encoders takes place directly from the integrated measurement encoders of the Simotion C240 controller. This prevents runtime delays caused by other electronic ballast. Grenzebach has coupled the longitudinal and lateral cutters of the line with a Simotion controller and the Sinamics S120 drive system networked via clock-synchronous Profibus DP. Thanks to its modular design, Sinamics S120 can be deployed in all areas of the line.

The conveyors are automated by two stand-alone controllers (Simatic S7 CPUs). In each area a Simotion C240 controller with the corresponding number of axes is integrated into the Sinamics S120 drive system. The applications in the C240 controller are responsible for the synchronization control, material transport, and machine positioning. The applications are initialized during power-up by means of a data telegram from the Simatic S7 control system (type of axis, gear ratio, etc.). There is also a central S7-300 F-CPU 317F-2PN/DP safety controller deployed throughout the line, which collects all emergency stop signals. When triggered, the safety program

generates data telegrams and sends them to the drives, which are safely shut down. To enable the C240 and safety controllers to transfer this information to the drives, the new Shared Device function of the CU 320-2 is used. The CU 320-2 is used in the Sinamics S120 drive system as a shared device in the float-glass units and communicates with two controllers. The CU 320-2 receives motion instructions from a Simotion C240 controller as well as safety-relevant data telegrams from the central safety controller. Parallel processing makes it possible to commit only one CPU to both tasks. (For more information on the Shared Device function, see p. 22.)

Stacking machines are expected to have short cycle times, stack glass precisely, and handle the cut sheets with care. In order to meet these requirements, Grenzebach is equipping its 4-axis portals with Sinumerik 840D sl and Sinamics S120. The standard stackers have their own Simatic S7-300 safety controllers and Sinamics S120. In the future the stackers and 4-axis portals will be linked with the overall network using PN/PN couplers. Using Profinet allows data exchange across plant sections at any time, both in the stacker cells and throughout the transport line.

Profinet creates new opportunities for industrial communication

By deploying Profinet, Grenzebach GmbH is breaking new ground in line automation. The Industrial Ethernet standard Profinet has largely replaced most of the previously used Profibus technology for fieldbus communication, so that the drives and controllers used in float plants are now networked using this technology with a redundant fiber-optic ring. Networking the entire transport line with Profinet offers the advantage of reducing response times from 20 milliseconds to 10 milliseconds. ■

info	www.grenzebach.com
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■ The Profinet Shared Device function

An Efficient Changeover to Profinet

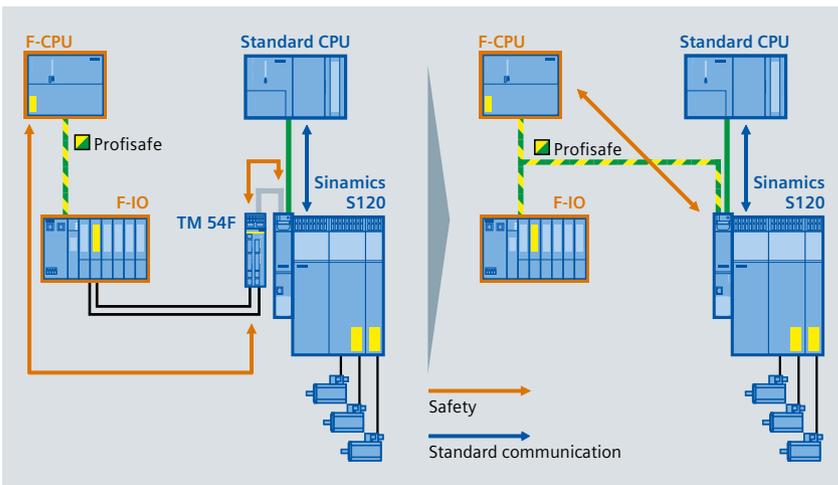
Profinet has made it easier to use standardized automation and safety technology in machines in a flexible, modular, and effective manner using the Shared Device function for Profisafe.

With implementation of the Shared Device function, hardware (IO devices, drives, etc.) can now be controlled by a standard CPU and a fail-safe CPU at the same time over one Profinet interface. Previously, the IO level had to be separately implemented for standard and fail-safe CPUs in glass industry plant equipment and machines. In this “classical” configuration, a fail-safe CPU controlled the fail-safe IO devices and the standard CPU controlled the standard IO devices. By extending Profinet standards to include the Shared Device function, IO stations can now be integrated into one device. The benefit to the customer is that this approach needs only one bus interface instead of two. In addition, less switch cabinet space and cabling are required.

Easy and safe – several drives, two CPUs

The Shared Device function is configured as follows: The Simatic ET 200S (FW 7.0 or higher) with all modules is engineered as usual with HW-Konfig (Step 7 V5.5 or higher). Then it is copied as a Shared Device and assigned to the second CPU. Finally, CPU access to modules is defined. The assignment is thus carried out on a module-by-module basis, with any combination of modules and CPUs possible. Because the IO device establishes communication with two CPUs that are independent of each other, no switch-on sequence needs to be followed.

This feature is also available for the Sinamics S120 frequency converter with CBE20 when using Sinamics V4.3.2. In this case, the fail-safe CPU can address the expanded safety functions in Sinamics S120 via Profisafe (Telegram 30), while the standard CPU can control the axis motion (e.g., via Profidrive telegrams). Previously, the extended safety functions for every Sinamics converter had to be implemented via a TM54F extension module. This can now be done in a more flexible way and more economically – for instance, by using one Simatic ET 200S F-CPU (IM151-8F PN/DP CPU) for several Sinamics drives. Thomas Kalnik, applications engineer at Siemens, confirms this: “With the Shared Device function, the requirements for combining standard and safety communication can be implemented flexibly and at a low cost for the customer. This reduces the cost of migrating machines and plant equipment to Profinet.” ■



Thanks to its F Shutdown feature, Sinamics Shared Device requires less cabling, reduces hardware requirements, and simplifies engineering

■ **Hyla Soft S.p.a., Italy**

Total Data and Process Control

Powered by customer-specific Simatic IT applications, Hyla Soft is able to implement software solutions that generate a high return on investment.

Hyla Soft S.p.a. specializes in customized software solutions. Thanks to its broad experience in a wide range of industry sectors, the software house is able to develop solutions that closely match applicable process regulations. A proven approach in Hyla Soft's day-to-day operations is to involve the customer in the implementation right from the start, allowing the software vendor to respond flexibly to any changes occurring as a solution is rolled out. After an analysis, a customer-centric software solution is developed that goes beyond the technological level by taking employees into consideration while always allowing customization to reflect the very latest in technology. The use of standard industry technologies has as much importance as integrating various organizational levels.

A solution for various environments

An application deployed for the float-glass company Manfredonia Vetro – a member of the Sangalli Group

Solution Partner

Automation

SIEMENS

Hyla Soft S.p.a., Genoa, Italy

With 110 employees, the high-performance systems integrator with comprehensive industry experience offers IT solutions for the manufacturing industry. Its close cooperation with customers leads to creative solutions that enhance customers' manufacturing processes, thus increasing efficiency and competitiveness.

Address: Hyla Soft S.p.a., Corso Europa 800,
16148 Genoa, Italy

Internet: www.hylasoft.com

– proves that this philosophy works very well. In order to improve the overall processes of Manfredonia Vetro's customers, Hyla Soft was asked to create a primarily field-oriented data recording system that would allow key system data to be captured, archived, and made available for evaluation by management. In addition, the new IT solution was expected to provide answers to process-related questions such as, How did the furnaces work for this job order? What temperatures did they reach? What is the chemical composition of the furnace atmosphere?, and thus enable rapid response times. The solution was a manufacturing execution system (MES) for recording, integrating, and standardizing data from various sources, such as manual operator inputs and tags (over 30,000) that are automatically scanned by Simatic IT using an integrated programmable logic controller (PLC). These data cover the entire production cycle, from raw material inputs all the way to the finished, ready-to-ship product. The data are then provided to the operators and technicians and sorted by job order, shift, or time period. In addition, a report can be created that traces and verifies the processes and products made by Manfredonia Vetro. This has enabled sustainable improvement in the company's workflow.

Added value is already a reality

Ongoing changes in industry make the management of data streams a more and more important factor impacting company efficiency. Given the sheer volume of data available, many companies need to employ specialists who have mastered complex IT systems and are able to implement the best possible solutions. The concept used by Hyla Soft with Simatic IT, which can be flexibly modified to correspond to various project phases, offers a viable means of ensuring that companies achieve a high return on their investment. ■

info

www.hylasoft.com



■ **Simatic PCS 7 V7.1**

Enhanced Efficiency, Transparency, and Control

With new functions delivering effective support to staff in the control room as well as in maintenance departments, the latest version of the Simatic PCS 7 process control system enables even more efficient plant operation.

The Simatic PCS 7 process control system is a versatile and powerful system allowing processes in the hot end of glass production to be controlled while maintaining optimal accessibility and precision. The outstanding characteristics of PCS 7 include end-to-end integration of the safety technology offered by the Safety Integrated solution. Safety Integrated for Process Automation offers a comprehensive suite of products for safe, fault-tolerant applications. The Advanced Process Control functions of Simatic PCS 7 allow the easy application of complex mathematical process control methods, facilitating the optimal control of complex glass production processes. The new Version 7.1 of the Simatic PCS 7 process control system introduces a host of functional enhancements. Improvements in all areas help reduce engineering, installation, and commissioning times while also decreasing operating and maintenance costs.

More efficient engineering and improved operation

In the case of engineering, for example, the Advanced Process Library offers new operating modes and greatly facilitates the interaction between operator and machine. An optimized color scheme and improved alarm functions mean that operating personnel can see critical states faster. New faceplates and trend displays provide a high level of data transparency, allowing the operator to

react promptly to process changes. Process images in 16:9 / 16:10 widescreen format offer more space for additional information. Through new ergonomic symbols and task-specific faceplates in the Advanced Process Library V7.1, the user benefits from a coherent operating environment and a uniform display of state information.

Improved analysis and diagnostic functions

The polling and analysis of historical and current process data have been simplified in the new Version 7.1, and maintenance functions have also been enhanced. The improved Trend Control function allows access to and visualization of trends directly at the operator station. With the new Data Monitor tool, a direct connection to process data can be established in Excel. Freely configurable Alarm Control functions can be used, for example, to filter alarms and export alarms for thorough analysis of critical plant states. Diagnostic information is now provided to web clients via a web server, offering greater maintenance flexibility. Using the IEC 61850 in PCS 7 to integrate switching systems lowers investment costs while also cutting operating and energy costs. ■

info

www.siemens.com/pcs7

■ **San Miguel Yamamura Packaging Corporation, the Philippines**

A Brand-New Package

In early 2010, San Miguel Yamamura Packaging Corporation completed a major modernization project in its Mandaue glass plant. The company upgraded its control system to an entirely new level and moved from single-loop control to a state-of-the-art process control system based on Simatic PCS 7.



Foto:la

San Miguel Yamamura Packaging Corporation (SMYPC) is a joint venture between San Miguel Corporation (SMC), Southeast Asia's largest food and beverage and packaging company, based in the Philippines, and Nihon Yamamura Glass Company Ltd. of Japan. Having started with one glass plant as a support business for SMC in 1938, SMYPC has expanded its operations to provide not only glass packaging products but other formats such as metal, paper, composites, plastics, and polyethylene terephthalate (PET) to serve the packaging requirements of a wide variety of industries. The company has also evolved to provide packaging services such as package research and testing, design, PET recycling, contract filling, trading, and other third-party services. Today, the company serves clients in the United States, Europe, Japan, and Australia, among other foreign markets.

A brand-new control package

One of the company's main production plants in the Philippines is located in Mandaue. In 2009, the company decided to make a major investment in its furnace process control, including the melter, refiner and forehearth, annealing lehrs, and production counters. The entire process control was to be upgraded from 20-year-old single-loop control technology to a state-of-the-art distributed control system. As Siemens had already successfully completed a Simatic PCS 7 project for San Miguel Yamamura Asia that had a comparable scope and technology, SMYPC was confident that Siemens had the glass process know-how, automation technology expertise, and portfolio required for such a project. Moreover, Siemens was able to offer excellent local engineering capabilities and support.

Rapid, trouble-free implementation

For the modernization project in Mandaue, Siemens supplied a Simatic PCS 7 system with three redundant PCS 7 automation systems and four operator systems. One big challenge was the tight time frame: the furnace controls had to be replaced



San Miguel Yamamura Packaging Corporation

The Mandaue glass plant of the San Miguel Yamamura Packaging Corporation

during an emergency repair of the furnace. In this critical phase, Siemens was able to demonstrate its project management and support capabilities. SMYPC will also benefit from this local expertise during operation, as the Philippine team from Siemens can provide fast and cost-effective support whenever needed.

Following the successful completion of the modernization in early 2010, SMYPC has already placed further orders with Siemens. Siemens will also upgrade the process control technology in the batch house to Simatic PCS 7. Future plans include a central monitoring and control system based on PCS 7 for all glass operation in the plant. ■

info

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■ CTIEC, China

Win-Win Solution

CTIEC chairman Peng Shou reveals the engineering company's growth strategy and shows how using Siemens products helps the Chinese company go global.

Like other Chinese companies, CTIEC was notified in 2002 that it would no longer receive projects and funding from the state. Board chairman Peng Shou realized CTIEC had to transition from a technical research institute to an engineering company serving society. To compete in an international market, Peng Shou integrated CTIEC's three major business areas of "glass, cement, architecture" and created four major brands: engineering, machinery and power generation equipment, minerals, and environmental and energy conservation. The company went from exporting single technologies to exporting sets of equipment.

CTIEC now holds about 80 percent of the market share in China's high-end glass technology market, and about 90 percent of the market share in foreign

glass production lines using Chinese technical design and construction. International sales provide over 70 percent of the company's revenues.

New opportunities

As CTIEC implements its "Go Global" strategy, it will establish outposts in key regions to promote CTIEC technology at a low cost. Asia, Africa, Latin America, the former Soviet Union, and the Middle East are focal points for the export of complete sets of technology and equipment, as well as flat and rolled glass, glass containers, and glassware.

The solar energy industry is growing even more rapidly than the IT sector worldwide. This has driven a rapid increase in demand for ultrawhite glass used in electricity generation systems. The lack of enter-



» **We have been working with Siemens for six years, and we expect continuing good cooperation in the future. CTIEC is the biggest glass and cement company in China. At present, we have 80 percent market share.** «

Peng Shou, Chairman of CTIEC

Peng Shou, CTIEC (left), and Bernhard Saftig, Siemens (right), signed the strategic cooperation agreement between CTIEC and Siemens



Toma Babovic

prises within China able to produce ultrawhite glass means that China relies entirely on imports. CTIEC's next development strategy is to create a solar energy group.

Self-cleaning glass has been developed that may be very dirty after a rainfall, but rapidly becomes clean as the wind blows. The ability to innovate on one's own raises the technical level even more quickly and further reduces energy consumption. China's building materials industry is a major consumer of resources and is also a major polluter, so Peng Shou also points to finding the proper way to restructure this industry as one of the current challenges in China.

Strategic alliances

Those who would be giants must walk with giants. In recent years, CTIEC has been holding to the concept of "walking with giants," transforming competition to seek broad cooperation and thereby bring about a multiple-win scenario, and also using the advantages of cooperation to supplement shortfalls. The company has strategic cooperation agreements with companies like TECO in the United States, Bottero in Italy, Mitsubishi in Japan, and Siemens in Germany. Most of CTIEC's overseas projects are equipped with Simatic PCS 7 systems. Using Siemens

as a technology and automation partner helps CTIEC win the trust of international customers. Since collaboration between Siemens began, Siemens has provided about 17 CTIEC projects with PCS 7 systems, and Siemens' PLC and drive products are installed in most cold-end equipment. In 2005, CTIEC and Siemens signed a cooperation agreement, later including Toledo Engineering, to equip two float-glass plants in Indonesia with a capacity of 900 tons of float glass per day. Simatic PCS 7 is used as a process automation system.

CTIEC was quite pleased with the cooperation with Siemens, and in 2005 awarded Siemens the Excellent Supplier Award for excellent support and price/performance ratio. In 2008, CTIEC contracted Siemens to supply a process control solution based on Simatic PCS 7 for two float lines of CSG Hebei Special Float Glass. The lines have a capacity of 900 and 600 tons per day. The project continued the successful cooperation between CTIEC and Siemens.



info

www.ctiec.net

■ Agenda Glas AG, Germany

Europe's Most Advanced and Cleanest Glass Factory

A newly built container glass plant that has just begun operations in Germany is both highly efficient and eco-friendly.

Agenda Glas AG in Gardelegen, Germany, started up Europe's most advanced container glassware plant in February 2010. Each year a total of 300 million containers of various sizes, or 95,000 tons of glass, are produced here for the German food and beverage industry. The facility also comprises design and product development departments. The new greenfield production plant takes advantage of the most advanced technologies for energy efficiency and environmental protection. All the factory's plant equipment was planned for energy-efficient operation and uses 10 percent less energy than comparable production plants. Thanks to highly advanced electrostatic filters for purifying exhaust gas, the plant already meets the EU pollutant emission requirements coming into effect in 2012. The heating and hot water supply for the factory shops, production rooms, and offices are all completely fed by waste heat. Cooling water flows through a closed loop, which, after natural cooling, recirculates the water to the units requiring cooling.

Power supply and process control by Siemens and partners

All plant equipment and components deployed by Siemens for the electrical power supply have been type-tested. SF6 medium-voltage 8DH10 switchgear provides the 20,000-volt supply. Four 20,000/400-volt Geafol transformers supply the four Sivacon low-voltage switchboards via one high-current 8PS busbar trunking system each. The low-voltage plants are linked with an 8PS high-current bus bar, which guarantees power supply even during faults.

The batch plant at Zippe Industrieanlagenbau GmbH is controlled via a Simatic S7 controller and the Simatic WinCC process monitoring and operating system. This ensures complete transparency within the batch house process. Agenda Glas utilizes a furnace with a regenerative heat recovery system supplied by Nikolaus Sorg GmbH & Co. KG. The waste heat from the furnace is recovered in a regenerator unit and immediately preheats the batch of



Europe's most advanced container glassware plant: the Agenda Glas production plant in Gardelegen

input materials. A Simatic S7-300 controller controls the melting process, and Simatic WinCC is also used for monitoring and operation in this unit.

Agenda Glas in Gardelegen is the first glass manufacturing plant to be newly constructed in Germany since 1981 and represents a capital commitment of €50 million. In 2009 the company won the Altmark region's Start-Up Award as a glassworks with great prospects. Executive board members Josef F. Bockhorst and Wolfram Seidensticker stand behind their mission: "As a modern manufacturer of container glass, we provide our industrial and trade customers with a broad portfolio that is unique in its quality, flexibility, and level of service." ■

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

Maximum Precision and Consistent Accuracy

The IS (individual section) machine at Sklostroj has eight sections featuring cutting-edge motion control technology



Leading the way in glass industry innovation, Sklostroj recently presented a new ISS machine. Equipped with state-of-the-art automation technology, the machine has no mechanical motion couplings or application-specific control technology but instead features standardized mechatronic solutions.

For 60 years, Sklostroj Turnov CZ s.r.o., has specialized in the development and construction of industrial plants used by glass manufacturers throughout the world, and the company has emerged as a leading manufacturer of container glass machines. With around 370 employees, the Czech company has manufacturing facilities in Turnov and Znojmo for producing customer-specific solutions for the hot and cold end of the glass production spectrum. The company's management places a strong emphasis on serving customers and has implemented a quality management system certified according to the ISO 9001-2000 standard.

All the mechanisms of the ISS machine that are directly in contact with glass are servo mechanisms. Particular attention was paid to the mold cooling, which was carefully approached and solved in a very

» sophisticated way with additional servo-axes. Because the IS machine is basically a heat exchanger, this function comes first when developing a new IS machine. The machine can have from 9 to 17 servo-axes per section, depending on customer requirements and the cooling version. Also, the machine comes ready, for example, as a Triple Gob 2x5 Inch or Double Gob 6¼ Inch. Other axis distances are available as well, ranging from the Single Gob to the Quad Gob model. The machine was designed to run up to 25 cycles per minute, depending on the product. It is the most modern container-glass machine with the highest number of servo-axes in the industry.

Maintaining quality, cutting costs

This design offers massive advantages over conventional IS machines. Because all important axes are servo, a very high repeatability and consistent quality are guaranteed during the entire production process, from the beginning to the end of the job, and long start-up or adjusting times for individual sections are eliminated. All parameters are stored in a database, and therefore quick job changes and start-ups are ensured. The easily understandable HMI was important to the machine developers as well, as it would greatly simplify the operation of the system. Because all the controls and the drives are built and programmed using the Siemens systems platform, no additional software is necessary. This also improves the handling of the system in many ways and provides some cost advantages. In addition, the machine needs significantly less oil and compressed air to produce a much higher number of glass containers and therefore protects the people and the environment around the equipment in terms of noise, dust, and dirt.

The Sklostroj portfolio includes machines with various constructional designs and capacity levels, which can be adapted for the relevant operating requirements. There are variants with 4, 6, 8, 10, or 12 production sections using monoblock technology. Other models, so-called tandem machines, are equipped with up to 16 parallel stations. The smallest version is a single-gob machine with four stations. The most modern and highest-performance ISS machine of the Czech manufacturer turns out approximately 1.3 million glass containers a day using a quad-gob layout with 12 stations. As a frame of reference, this is the equivalent of what is required for manufacturers of pharmaceuticals or baby food in one day.

Highly precise motion control

With the new ISS machine, glass manufacturers achieve high throughput performance while consuming less energy. With its modular design, the machine can also be easily modified to meet cus-

tomers requirements. In terms of motion control, the machines are automated using Simotion and Sinamics technology, and both areas are completely networked using Profinet technology. This means seamless real-time communication and unlimited simultaneous TCP/IP communication has been implemented. The outcome: consistently high product quality based on high-precision motion control and reproducibility.

The motion control solution ensures that all assemblies are synchronized with a high degree of precision even under extreme high-temperature manufacturing conditions. This includes the smooth gob formation of the plunger, the highly dynamic and precise cutting of individual glass gobs, the reliable provisioning of all production sections by the gob distributor, the shaping of the glass containers in the individual sections, and the synchronized discharge of the glass units to the cooling track. In addition to exact timing and the highest precision in all process steps, precise synchronization of the motion control solution also reduces wear on molds and assemblies.

Central safety control

The control and technology tasks are handled by a Simotion D445-1 CPU. An additional Simotion controller is installed at each station and the pusher. The master Simotion controller controls the machine infeed (gob distributor, shears, etc.) and sends the master axis values via Profinet IRT (isochronous real time) to the stations (slaves). The stations receive the data for various synchronous axes. The connection between Simotion and Profinet makes automated station recognition possible. This simplifies maintenance work and project management while also facilitating station upgrades.

Because safety technology has a key role to play in glass manufacturing, Sklostroj is concentrating more strongly on the related monitoring and control devices. The standard integrated safety functions in Sinamics drives mean that no additional external monitoring devices are required. The central safety control has a fail-safe PLC (S7 ET 200S Safety PLC IM151-8F) and thus achieves level D performance. All safety functions can be controlled by the Profisafe communication profile via Profinet.

Pusher system ensures smooth motion

The pusher system transfers the glass containers from the dead plate of the IS machine onto the conveyor belt. The pusher is a key component that is decisive in the performance capability of glass machines. Sklostroj was one of the first companies to develop an electronically controlled pusher system, which was patented in 1997. The new EP97-04, known as the E-Pusher, is servo-electrically driven and electronically controlled. With up to 25 cycles a

minute per station, the pusher is the most powerful on the market and is ideally suited for single- and double-gob IS machines. Depending on the glass product and the conveyor belt speeds, the E-Pusher can also be used for triple-gob applications.

The EP97-04 offers substantial advantages over conventional E-Pushers. Because the systems normally only carry out 90-degree rotations, they have only a limited ability to track the motion of products on the conveyor belt. Because of the unsynchronized operation, glass containers are repeatedly dropped and bottlenecks occur. Many pushers still rely on compressed air to move fingers forward and backward. However, leaks occur when the machines are operated with compressed air, increasing demand for air and thus driving costs up. The Sklostroj system, in contrast, ensures even motion and a high degree of reliability. This reduces the dropping of glasses and optimizes conveyor belt transport. Finger replacements can be carried out in a few easy steps with the EP97-04.

The Simotion motion control system features structured programming that has multiple benefits – especially in engineering the E-Pusher, it enables rapid and easy implementation of the application. Simotion helps achieve a start-time precision of less than 10 microseconds, which is possible only through the use of standard technology functions.

Software modules speed up programming effort

The setup of the E-Pusher is carried out flexibly and directly on the conveyor belt with Simatic Mobile Panels 277 IWLAN (MP277) and the WinCC graphical user interface. This also includes the curve profile design of the pusher system. The correct synchronization between forward, backward, and rotary motion is the prerequisite for the precise positioning of glass containers on the rapidly moving conveyor belt. Each pusher can be controlled with an individual acceleration profile. And each profile can be downloaded to the control during operation without causing production delays.

The E-Pushers by Sklostroj are designed as independent solutions. This gives glass manufacturers the option to replace the pushers in their existing production lines with the high-performance EP97-04 product. The modular systems are ideally suited for rapidly and easily converting existing plant equipment regardless of its configuration. ■



Sklostroj's portfolio covers machines for containers of all sizes

info

www.sklostroj.cz



■ **Schlemmer Prozess Systeme GmbH, Germany**

A New Benchmark in Tableware Production

Schlemmer Prozess Systeme uses compact Simotion motion controllers in the modular design of rotary glassblowing machines. This results in reduced downtime, higher productivity, and optimized maintenance.

The idea of constructing modular rotary glassblowing machines with 20 or more integrated – that is, individually exchangeable – stations or segments has been around for a long time. However, the technological capability to house all mechanical and, in particular, control and drive components in a minimal space was not available until now.

For an Asian glass manufacturer that required a new production line for flute glasses consisting of a 16-station stem press and a 24-station blow-molding

machine, three companies from Germany and Austria developed a technologically and commercially convincing solution. In a very short time, Forma Glas GmbH from Neukirchen/Enknach, Austria; SPS Schlemmer Prozess Systeme GmbH from Deggendorf Germany; and Faschang Werkzeugbau GmbH from Weng im Innkreis, Austria, together developed the first modular rotary glassblowing machine in the world. Software development was supported by R&D funds from the Central Innovation Program for Small and Medium-Sized Enterprises (Zentrales Innovationsprogramm Mittelstand, or ZIM).

Solution Partner

Automation

SIEMENS

SPS Schlemmer Prozess Systeme GmbH, Deggendorf, Germany

SPS GmbH, founded in 1992, is an innovative company operating globally in the area of measurement, control, and regulation technology. The company's automation solutions focus on analysis of manufacturing processes, planning, project planning for and automation of new systems, and company-wide automation solutions based on Simatic PCS 7, as well as system simulation and staff training.

Employees: 9

Address: Schlemmer Prozess Systeme GmbH, Greising 40, 94469 Deggendorf, Germany

Web site: www.sps-gmbh.de

Achieving goals quickly with state-of-the-art automation technology

"The greatest challenge," said Heribert Schlemmer, managing director of SPS GmbH, "was to accommodate all control and drive components for the rotary motion of the blowing and servo lift station and for the lifting motion of the servo lift station in one cabinet in the segment. If a fault occurs that cannot be rectified immediately, the affected segment can be quickly removed from the process and replaced by an operational segment." That way, downtimes and waste product could be minimized and the required output of up to 40 cuts per minute (depending on the articles produced) could be achieved.

The new Simotion D410 PN for single-axis applications offered a powerful, modular, and compact motion controller for precise, sensitive servo control of the lifting motion of the servo lift station and setting the blowing pressure. When attached to a PM340 power module on the Sinamics S120 drive system, the device requires only minimal installation space, allowing sufficient room for two Micromaster converters, terminal modules, voltage supply, and peripherals in the switching cabinet.

Higher availability through optimized maintenance

This approach enabled a segment design that greatly facilitates maintenance. Thanks to quick couplings for air, water, and lubrication along with plug-in

connectors for the power supply and communication at the distributed switching cabinets, trained production workers can replace a segment in less than five minutes. Replacing individual components is also easier because all the components of the drive lineup communicate via the digital Drive-CLiQ system bus and all settings are stored on a Compact-Flash card. An additional advantage is that the virtually standardized segments can be exchanged between multiple blowing machines, and to a certain extent also between machines with a higher or lower number of stations. Even the tower no longer features any components that cannot be replaced within a few minutes. This is a further improvement in terms of maintainability compared with machines that have a centralized design. Annual production has increased by at least 5 percent thanks to the new modular machine generation, says Rudolf Bernroitner, managing director of Forma Glas GmbH.

Fast networking via Profinet

The Profinet variant of the Simotion D410 is equipped with two Profinet ports via which all 24 stations communicate in real time (Profinet RT) with a Simotion D445-1 that works as a master. This high-performance motion controller is installed in the tower switching cabinet and linked to an additional Simotion D445-1 in the main switching cabinet located on the ground by slip ring connections via clock-synchronous Profibus and Industrial Ethernet. These two controllers are used to distribute formulations and target data to the individual stations and, conversely, for exchanging and centrally





The first modular glass-blowing machine in the world with 24 identically designed, networked stations by Kutzscher, SPS GmbH, and Faschang Werkzeugbau



The multilingual user interface under WinCC flexible allows the entire process to be set up and operated even more easily

► visualizing current data and process information. In addition, the controller installed on the ground coordinates the servodrives and thus the interaction between the table drive, feeder machine, extraction, transfer, prepress, converter, and stem infeed.

As a certified Siemens Solution Partner for motion control solutions, SPS GmbH has been familiar with and used the Simotion system for more than four years. Here too, programmer Andreas Lindhuber incorporated all the available functions to synchronize the above-mentioned system components and to realize a fast and harmonious yet flexibly modifiable process. Furthermore, he exploited the integrated programmable logic controller (PLC) functions in the Simotion family and implemented process control in the motion controller. This has resulted in a superimposed PLC and, consequently, in a reduction in costs.

Moreover, the solution uses automatic recording and setting of the mold height for each station, which enables reworked molds to be used without manual adjustment and minimizes the waste quota. The machine design also allows using a dual transfer and servo press station so that significantly higher cut numbers can be handled if the products permit it. "The high performance density in modern controllers will in the future enable us to fulfill specific customer requirements even more easily and cost-effectively," predicts Bernroither, "either by integrating additional components or simply through a customized design of the user interface."

Straightforward user guidance

The second focus of enhancing the machine by means of a modular design was on even greater ease of use in terms of user guidance and improved process transparency. A prerequisite for this was the

transfer of large data volumes via fast bus systems. A multilingual user interface was developed under Simatic WinCC flexible, which easily guides the user through the entire process. The operator can store optimized setting parameters for a certain product as a formulation on a one-off basis and document all required ancillary components in the formulation as well. This not only considerably reduces the setup time for repeating runs, but also allows operating stations with up to five different formulation sets. Another state-of-the-art feature is the remote access via a virtual private network tunnel if the maintenance staff requires support or if updates need to be loaded. This saves time and cost-intensive on-site service calls and frees automation staff capacity to perform other tasks.

Modularity brings benefits in all areas

Last but not least, the modular design is beneficial for dispatch and commissioning: the basic structure of the machine can be packaged and shipped separately from the blowing stations, resulting in reduced costs. Commissioning time can also be significantly reduced. The first modular machine was completely assembled at Faschang, measured by laser, tested in a dry run, and accepted by the operator. Only the segments need to be mounted on-site, connected, and briefly checked again. In fact, everyone involved prior to the first commissioning at the end customer's facility is convinced that the new, modular machine generation will meet the high customer requirements and establish itself on the world market after its debut in Asia. ■

■ Forvet S.r.l., Italy

Revolutionary Control

Pleased with past success, an Italian glass-working company uses a Siemens solution to control a machine with revolutionary technology.

The Italian company Forvet produces leading drilling, grinding, and milling machines for building and furniture glass. Forvet's latest model not only has revolutionary capabilities, but can work in tandem with other machines. The automation and control demands are high, so Forvet uses Siemens controls – because of past success and also because of the reliability, performance, and flexibility of the Siemens control and drive systems.

A modular grinding solution

The new grinding machine, the Chiara Modular MPT8, represents a true revolution. It performs grinding and polishing of perpendicular and out-of-square sides and can be equipped with corner dubbing. It can operate on all sides of the glass simultaneously, from a regular triangle to an irregular polygon. Thanks to the high-performance, drive-based Simotion D controller, which enables complete control of every machine action, it is possible to grind glass that is 3 millimeters thick with dimensions of 300 by 400 millimeters, and then immediately after, without intermediate settings, grind glass that is 19 millimeters thick with dimensions of up to 3,300 by 6,000 millimeters.

The Chiara Modular MPT8 can work in sequence, without manual intervention, on glass of different thicknesses, sizes, and shapes. It can also work each side of the same piece of glass with a different edge finish (one side bright grinding, one side rough grinding, one side only seamed, etc.). During production, the glass is supported by an automatic vacuum system with suction cups managed according to the size of the glass. This makes the Chiara the only grinding machine that guarantees no contact with the low-emissivity (low-e) treated surface. The Simotion D445 controller makes this possible.

A perfect team

The integration of the Chiara with the Francesca machining center, which performs automatic milling, countersinking, and drilling, marries the ability to grind and polish irregular polygons with the ability to drill and mill the same plates and to work on two plates at once. The Francesca can be loaded automatically from the Chiara, loaded manually, or loaded from both sources at once.



Forvet builds sophisticated high-performance glass processing machines such as the Chiara Modular line of grinding machines

Key points

- ▶ The Chiara Modular MPT8 can work on irregular shapes and provide different edge finishes simultaneously, with little or no contact with the glass's treated surface.
- ▶ The proven reliability and performance characteristics of Siemens control technology made it Forvet's natural choice for a solution.
- ▶ Thanks to the drive-based Simotion controllers, complete automation is possible for every action and sequence of the Chiara machine.

The Chiara has the characteristics of all Forvet machines: no minimum distance between holes or notches, maximum thickness up to 19–25 millimeters, drilling diameter up to 70 millimeters, automatic tool wear compensation, automatic lubrication of all moving parts, the ability to provide different finishes on each side of each polygon, and the handling of low-e glass with no contact with the magnetron side. ■

info

www.forvet.it

■ Bystronic Lenhardt GmbH, Germany

Efficiency in Line

Innovative control technology for innovative manufacturing: insulating glass processing specialist Bystronic Lenhardt places its trust in drive-based motion control technology to achieve highly dynamic movement and flawless insulating results.



Bystronic Lenhardt GmbH is an innovative solution provider for the cost-effective production of architectural glass. Together with Siemens application engineers, the company developed a modular insulating glass window assembly line. Bystronic Lenhardt's sash glazing line incorporates Sashlite™ technology, which is both flexible and productive. The sashline consists of individual machines and stations for the application of desiccant, simultaneous application of sealant and bonding, glass lite washing, and sash and lite sealing, as well as the pressing and gas filling of the completed sash unit.

Each of these machines has its own "intelligence" consisting of the Simotion D445 drive-based motion control system and a Simatic industrial PC with a customer-specific Windows user interface. The integration of motion control, PLC, and technology functions in the Simotion devices reduces the amount of hardware required and thus the synchronization work required within a machine module,

- ◀ The flexible and modular design of the sashline allows high-quality insulating glass windows to be manufactured
- ▼ Simotion D controls the motion of the applicator heads to match the overall movement for excellent seal results



All photos: Bystronic glass

and it streamlines interaction with remote units. The motion controllers are interconnected as well as linked to a central server for job order control and administration via Industrial Ethernet.

The highly efficient controller-controller communication in this networked line enables the use of an LCom library developed by the Siemens Technology and Applications Center (TAC). Data exchange between the controller and the HMI system of each module is based on the latest OPC XML techniques, allowing transmission rates of under 100 milliseconds for the 3,000 variables. This is especially important for archiving process data at the data-intensive application stations.

Fully automated production of customized windows

The sashline concept is the perfect solution for fully automated window sash production and is capable of processing a broad variety of sash sizes and designs. The glass pane and the corresponding sash profiles are processed on separate production lines, transferred to a swivel station for combined assembly, and precisely positioned and pressed into a single unit (assembly). During assembly, gas is filled between the glazing panes, ensuring the highest level of window quality. The sashline produces a completely assembled window every 30 seconds.

In addition to the assembly technology, the most technologically demanding parts are the desiccant (SashDri™) and sealant (SashSeal™) applicator stations. The TopLoading (TLd) standard library developed together with Simotion for handling applications implements the highly dynamic and precise track movements of the applicator heads. The sealant station is moved into position from two sides along electronically synchronized and coupled axes. This enables not only linear but also any curved motion paths so that individual window designs in very small batch sizes can be manufactured. In addition, using only a few polynomial descriptions computed by the CAD system, smooth and highly dynamic track motions can be interpolated, especially for changing directions in the profile corners. Because the rotation of individual applicator machine heads during changes in direction is coupled via an electronic cam to the overall movement, the motion speed in the corners (and where necessary when changing directions for rounded profiles) is adjusted with a corresponding volume-controlled application of the sealant, ensuring consistent sealing quality at each point of the window profile.

Fast-track development and commissioning

The Simotion TLd standard library substantially reduces the amount of programming needed both for engineering and in application. The user can also program the Simotion system using the high-level

Structured Text (ST) language, facilitating the setting of breakpoints for easier troubleshooting. Troubleshooting is also supported by the powerful Simotion trace functionality, which reduces the time needed to become familiar with the technology and the process. "The total effect of this solution approach is a considerably faster development of software modules and commissioning. Thanks to the parameterizable software concept, complex turnkey sashlines can also go into production in a narrow time frame," says Jürgen Schnorr, head of engineering at Bystronic Lenhardt.

»Thanks to the parameterizable software concept, even complex turnkey sashlines are ready for production in a very short time.«

Jürgen Schnorr, Head of Engineering at Bystronic Lenhardt

The company also benefits from many scripting features available with Simotion, such as for the nearly fully automated parameterization of projects or for identical axes, or for version control. Whenever a project is opened, a script automatically checks whether there is a more recent version of the project libraries or software modules on the server, and the operator is given the option to update or not. Commissioning times can also be further reduced by running a simulation of the entire application on a PC at the office ahead of time. This makes it possible to carry out machine programming, testing, and optimization in advance so that everything is taken care of before going on-site.

Siemens project manager Thomas Hennefelder is certain that the glass manufacturer has gotten the right controller by choosing the Simotion D445: "We wanted to meet Bystronic Lenhardt's demanding requirements regarding controller stability and functionality. They also wanted an open, high-performance interface connection and troubleshooting based on trace functionality and debugging. We were able to offer the right concept at the right time with Simotion and the Scout engineering system." ■

info

www.lenhardt.de



■ Schott AG, Germany

A Cost-Effective Alternative

Retrofitting systems with modern control and drive technology can give aging plant equipment a new lease on life. At Schott AG the complete overhaul of a plant for manufacturing glass ceramics resulted in higher productivity and energy savings.

Founded over 125 years ago as a specialty-glass production plant in Jena, Germany, Schott now has sites spread across the globe for the development and production of specialty materials, components, and systems for use in household appliances, pharmaceuticals, solar energy, electronics, optics, and imaging as well as the automotive sector. Employing elaborate melting and processing techniques, 50,000 products are manufactured using over 400 types of glass. Glass is melted in gas-fired, oil-fired, or electrically heated furnaces. Depending on the type of glass and glass batch composition, the melting temperature is between 1,000 and 1,600 degrees Celsius. After melting, depending on its ultimate use, the glass is drawn, rolled, pressed, blown, and undergoes further processing.

One of these processes is ceramization, a technique for producing glass ceramic used in applications such as Ceran® cooktop panels. A mixed glass/crystal structure is formed through the crystallization of the melted glass in a controlled time/temperature process. This process must take place within highly precise parameters in order to achieve the required physical properties such as high thermal shock resistance.

One of the furnaces used by Schott for manufacturing glass ceramic has been in service since the 1980s. The furnace was still in good condition but its control and drive technology was no longer state of the art. In order to increase efficiency and also lower energy consumption, the decision was made to modernize the existing control and drive technology used in the 80-by-10-meter production plant and carry out a retrofit program to meet new safety standards.

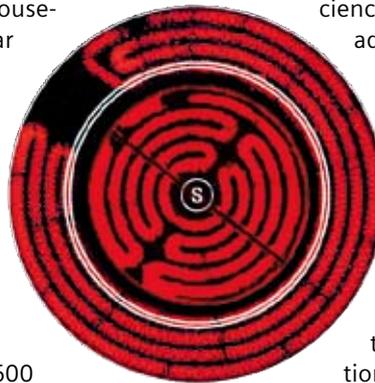
Modernizing the control and drive system

In collaboration with Siemens, Schott's management developed a strategy for upgrading equipment in the ceramization plant in order to improve efficiency and equipment availability. In addition, operating personnel were to be given easy-to-use diagnostic options that make malfunctions more manageable.

Another objective was to comply with the most recent machine and occupational health and safety standards and achieve higher order-volume throughput thanks to greater machine utilization. An important consideration in the retrofit program was to complete modernization of the plant without downtime.

Schott chose a powerful Simatic S7-400 controller for the manufacturing and process automation of the ceramization furnace. The controller coordinates process flows, manages subordinated systems, has a modular design, and can be scaled up at any time. Controller configuration can be modified while the system is running. The S7-400 controller signal modules can be hot-swapped at any time (removed and inserted with the system powered), allowing plant expansion or the replacement of signal modules after a fault.

The new furnace drive system consists of a Sinamics S120 system combined with 1FK7 synchronous motors. Its modular design allows the right solution to be configured with minimal effort. Connecting the motors was also easy thanks to the prefabricated cables that facilitate fast and safe connection to the frequency converter. The PC-based WinCC software is used for the visualization and user interface of the plant's monitoring and control system.





Ceramization, as is used when manufacturing Ceran® cooktop panels, is an important business segment of Schott AG

All photos: Schott AG



Rapid and simple drive configuration

One challenge involved in the project was axis positioning. Combined with the Sinamics S120 drive system, a basic positioner function module (EPos) was installed for precise positioning of the axes, eliminating the need for higher-level position control and enabling rapid signal processing. A further tool employed in the Schott project was a Drive Control Chart (DCC), which was used to program the drive system's technological functions to match the ceramization furnace specifications. Fast and easy configuration of the drive for the Schott retrofit program was made possible by the Sizer software tool. The tool guides project members through all the graphic configuration steps – from the line supply and the motors all the way to the drive components and controllers. During commissioning, project members benefit from the Starter commissioning tool while completing parameterization, system setup, diagnostics, and service tasks. Users simply select the corresponding devices on the screen and configure them with the correct control values. The tool's service and diagnostic functions can be accessed directly on the device or via teleservice.

Retrofitting increases plant availability

The retrofit made it possible for Schott AG to utilize its existing capital investment, because only those

An overview of retrofit components

- ▶ Simatic S7-400
- ▶ Sinamics S120 with basic positioner function module (EPos) and Drive Control Chart (DCC)
- ▶ Sizer and Starter engineering software
- ▶ 1FK7 synchronous motors
- ▶ Simatic WinCC
- ▶ Profinet IO devices

parts of the plant that were outdated were replaced. The efficiency of the installed ceramization furnace was considerably increased. Upgrading the periphery equipment to Simatic S7-400 and Profinet IO devices not only made it possible to achieve greater plant availability but also introduced straightforward ways to perform diagnostic functions, making faults easier to manage. In order to avoid problems in the event of a power outage, an additional uninterruptible power supply (UPS) module was installed. The most up-to-date control and drive technology also allowed productivity reserves to be utilized. ■

info

www.schott.com

■ Osram GmbH, Germany

Glass Tubes for Energy-Saving Lamps

The Osram production plant in Augsburg, Germany, has upgraded its process control system to include the most advanced technology. The plant now utilizes waste heat and filtered dust as raw materials and has reduced emissions at the same time.

Osram is one of the world's premier lighting systems suppliers and is part of the Siemens Industry Sector. In 2009 the company generated revenues totaling €4 billion, including 88 percent outside Germany. More than 66 percent of revenues were achieved with energy-efficient products, and this share of sales revenue is expected to increase by 80 percent in the coming years. Osram has over 39,000 employees around the world, supplies customers in approximately 150 countries, and operates 46 manufacturing plants in 17 countries. The trademark "OSRAM" goes back to 1906 and consists of letters from the names "osmium" and "wolfram," metallic elements commonly used in incandescent filament materials at that time. Siemens has held all shares in the company since 1978.

At the Augsburg Osram glass manufacturing plant, up to 1.2 million glass tubes for fluorescent and

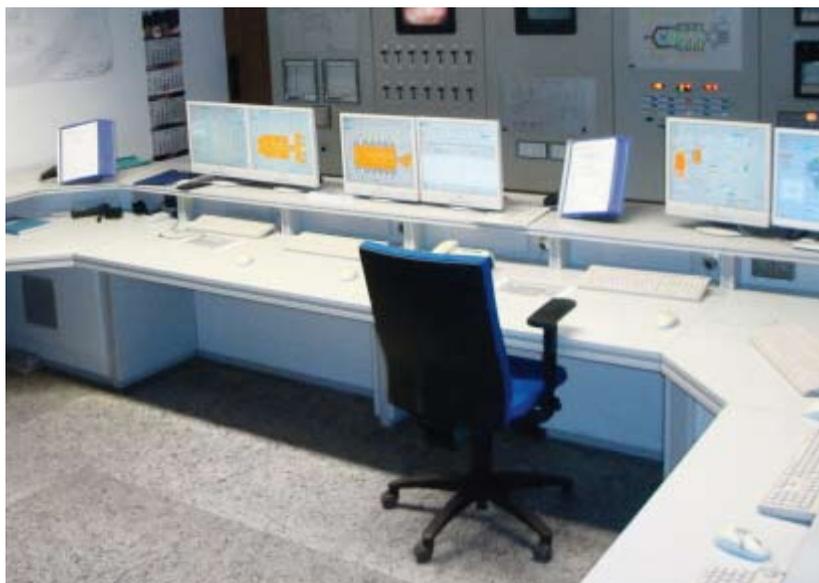
energy-saving lamps come off the production line, controlled and monitored by an advanced Simatic PCS 7 / WinCC system as well as 13 Simatic S7-400 controllers for individual plant components.

Hollow glass for fluorescent tubes and energy-saving lamps

Up to 960,000 glass tubes are manufactured per day on six production lines. There are two kinds of furnaces used for varying types of glass. A regeneratively heated furnace with an output of up to 175 tons a day melts the glass for the fluorescent lamps. In order to achieve maximum efficiency, the furnace chambers are preheated for 20 minutes at a time for each successive furnace cycle. The second furnace is a smaller, continuously heated recuperative furnace with an output of 50 tons a day. This glass is used to produce Dulux energy-saving lamps.

PCS 7 connects all the plant units that are controlled by S7-400 controllers

- ▶ 2 furnaces
- ▶ 2 weigh feeders with Siwarex units
- ▶ 6 glass tube drawing machines for furnaces and weighing systems in the batch plant
- ▶ Central alarm system
- ▶ Batch house control system
- ▶ Cullet recycling and feed control system
- ▶ High-voltage flue gas filter with induced draft fan



View of the control room at Osram's glass production plant

Of the total glass tubing produced, 60 percent is processed by the company's own lamp production plant in the immediate vicinity. Transfer is carried out via a fully automated transport system that temporarily places the tubes in a buffer high-bay storage facility with 10,000 storage locations and then ships tubing to the lamp production plant. The remaining 40 percent is purchased by lamp manufacturers from all over the world.

Automation increased through the years in response to newer products

The glass production plant was built in 1952. Over time, the amount of automation increased, evolving with the introduction of new products. Before the company switched over to PCS 7 with WinCC in 1999, an AS235 Teleperm control system was used as a production regulation and control system with which only the two furnaces were operated. After this it was possible to integrate the forehearth into the system using Profibus. The most recent modernization step was completed just a few months ago. Now a highly advanced PCS 7 control system networks and controls all 13 plant components that are equipped with S7-400 controllers. Each controller runs autonomously. In order to operate and monitor them at the central WinCC control station, the controllers are interconnected within the plant using an extensive Industrial Ethernet ring structure. The furnaces, the glass drawing units, and the filter system with automated control circuits are equipped with Sipart controllers, and ventilation is provided using Simocode control elements via the central control system.

Putting environmental protection first

Heat exchangers are used to capture up to 80 percent of the manufacturing plant's own annual requirements for heating and warm water. The heat is recovered via a fire-tube boiler and a water-tube boiler. Given the close proximity to the city of Augsburg, reducing emissions to air is a particularly

important issue. The reduction of nitrogen oxide (NO_x) emissions is achieved with ammonia, which is introduced into the furnace chambers in gaseous form and undergoes chemical reaction in the furnace at temperatures between 850 and 1,000 degrees Celsius. Water and nitrogen are the resulting by-products. The Augsburg-based company uses the Ultramat analysis and measurement device for continuous measurement of nitrogen and carbon dioxide, which transfers the measured values directly to an emission monitor that analyzes the data and stores them in accordance with the "Technical Instructions on Air Quality" (TA Luft). An Ultramat device also controls the carbon dioxide balance. In the process, the air mix at the burners is adjusted so that the exhaust contains no carbon monoxide even if the plant is operating at full capacity. Finally, a filter plant with four high-voltage filter zones ensures that dust emissions are kept to an absolute minimum. The filter system recycles the dust back into the batch house.

The most recent project is the construction of a central cooling plant where water will be used as a cooling medium for the assemblies and periphery equipment. The key part of this project is a central absorber, which will be cooled using cooling water supplied by a drainage water network of the city of Augsburg. The new unit will replace all energy-intensive refrigerating units. There is also a PCS 7/WinCC-supported measuring system being planned with Sentron measuring devices for monitoring electrical energy in the various power outlets as well as a load management system for electricity and gas. Implementing these measures means the production plant is utilizing all technologies currently available for protecting the environment and reducing energy consumption. ■

info

www.osram.com



Teplotechna – Prima Ltd., Czech Republic

Innovative High-Frequency Melting

Teplotechna – Prima was founded in 1991 through the privatization and merger of two state-owned companies in Teplice, Czech Republic, a region with a long glassmaking tradition. With a strong focus on technology, Teplotechna develops, plans, and builds turnkey furnaces that meet all technical and ecological requirements for state-of-the-art glass production. These furnaces are in operation in Western Europe, but they are also being deployed more and more frequently in Russia and Ukraine as well.

Teplotechna's engineers are currently developing a new generation of energy-saving and environmentally friendly furnaces featuring high-frequency induction heating technology. The basis for this technology is continuous wave magnetrons – previously used for industrial heating and drying, the generation of plasma, and in microwave ovens –

that have now been adapted for use in the glass industry by Teplotechna.

Teplotechna relies on Totally Integrated Automation with Simatic control systems and has recently started using Simocode devices for the monitoring of drives. This allows the operator at the monitor to have motor loads in constant view and to intervene in a timely way if needed. "Because of their flexibility and close relationship with us and our customers, Siemens is an ideal partner when it comes to process automation and control," explains general manager and owner Vlastimil Burian. ■

info

www.teplotechna-prima.czechtrade.us

FlammaTec Ltd., Czech Republic

Low Energy Consumption, Low Emissions

The f | glass operation near Magdeburg, Germany, started its new float furnace in July 2009. The float furnace is designed to manufacture float glass as well as low-iron and very low-iron glass for solar applications. f | glass has selected the FlammaTec flex injector from FlammaTec Ltd. of the Czech Republic as the gas injector supplier. The injector has been designed and optimized by extensive mathematical modeling by FlammaTec's parent companies, Glass Service Inc., Czech Republic, and STG GmbH Cottbus, Germany. Glass Service Inc. and STG are joint venture partners.

The two separate gas inlet controls allow optimal and flexible (yet still reproducible) flame control even with a constant total gas input per injector. The combination of an exceptional furnace design, using an advanced control system (Simatic PCS 7), and oxygen sensors from STG Cottbus allows f | glass to achieve excellent results in terms of energy consumption and emissions. Furthermore,

the glass is excellent, with very low defect levels. Due to low crown temperatures the furnace can be operated with a large degree of flexibility and a long lifetime can be expected.

The furnace operates with an energy consumption of less than approximately 5.2 MJ/kg at 700 tons per day and NO_x emissions of approximately 800 mg/m³ (dry, 8% O₂) since its start of operation. The energy consumption is about 1 MJ/kg less compared to the average float-furnace consumption in Western Europe. Of course, these excellent results can only be achieved if all factors are combined and optimal. ■

info

www.flammatec.com
www.gsl.cz
www.stg-cottbus.com

Horn Glass Industries AG, Germany

Turnkey Facilities from a Single Source

Horn Glass Industries AG can look back on a 125-year history. August Horn established the company bearing his name in 1884, and it has remained in the hands of the family for several generations, only assuming its present legal form in 1999. Horn, which has 195 employees, achieved €38 million in sales revenue in 2009. In addition to operations in the Czech Republic and Slovenia, a third subsidiary is being set up in India.

Thanks to many years of project experience, technical know-how, and high quality standards, Horn has gained an excellent reputation as a supplier of turnkey plants for container and flat glass, tableware, insulating glass, endless fiberglass,

and technical glass production facilities located all over the world.

“Based on what our customers want, project responsibility is being placed to a greater and greater extent in a single pair of hands in order to avoid coordination problems and ensure that projects run smoothly. This is exactly what we do. We take on the role of general contractor for new plants, recruit additional trades, and bring everything together into a single turnkey package: planning and design, manufacturing and installation, setup and commissioning,” explains plant design engineer Roland Haberkorn, head of the electrical technology department at Horn. Given the increasing prices of raw

materials and energy, cutting back on energy consumption and emissions is becoming more and more important. Modern plant equipment requires the latest technologies. That is why Siemens is the primary supplier of control technology to Horn. A key objective is that everything fit together perfectly, from sensors to drives to process control systems. Horn is able to deliver seamless technology based on Simatic S7 with WinCC as well as PCS 7 systems. In the future, Horn will make expand its use of the industry-tested Simatic PCS 7 process control system. ■

info

www.hornglass.com

DTEC Engineering & Consulting GmbH, Germany

Float-Glass All-Rounder

DTEC Engineering & Consulting GmbH in Gelsenkirchen, Germany, is an experienced and innovative float-glass specialist with a comprehensive range of services covering production, processing, and finishing. The company considers both technological and economic aspects when planning new plants. Founded in 1999, the company has equity holdings in several companies operating in the container glass industry. The DTEC Group employs about 70 people and has branch operations and alliances in Brazil, Belarus, China, and Thailand.

Based on state-of-the-art technology and industry know-how, the engineering department develops concepts for buildings and plant technology; warehousing and logistics; and the optimization of energy consumption, quality improvement, security, environmental protection, and health and safety. In order to ensure the profitability of plants into the future, DTEC carries out risk analyses and profitability studies, develops business plans, and works out financing models. In the planning and implementation of new float-glass plants, DTEC assumes complete responsibility for project management, including time, cost, and quality control.

In 2009 a float-glass plant with a daily output of 780 tons was started up by Gomel Steklo in Belarus. As



Felix Nürmberger

general contractor, DTEC was responsible for construction and within two years had completed design and engineering work, project management, and supervision of construction on its own. For the provision of energy and process automation, teaming up with Siemens on this major project proved to be valuable. Simoprime medium-voltage switchgear and 10 transformers (6/0.4 kilovolt) provide a fail-safe power supply. The Simatic PCS 7 process control system manages all process operations and provides access to all production data. ■

info

www.dtec.org

Nikolaus Sorg GmbH & Co. KG, Germany

Innovations for Glass Production

The Sorg Group in Lohr am Main, which today is owned and managed by the fourth and fifth generations of the Sorg family, currently has 340 employees and supplies customers all across the globe. There are over 250 Sorg furnaces in operation throughout the world. The company's products cover the entire range of melting and glass-conditioning processes.

In May 2010, Sorg, which is well known and respected for its culture of innovation, presented a new concept for handling batch material and cullet at the furnace. It consists of three components: the batch preheater, the batch charger, and a newly developed doghouse design. The preheater can be operated without cullet and yields energy savings of about 10 percent. The batch charger enables an enclosed design for the doghouse, preventing the uncontrolled entry of cold air through the doghouse and thus reducing nitrogen oxide (NO_x) emissions.

Sorg has worked successfully with Siemens for over 40 years and has now also become a Siemens Solution Partner. The two companies initially collaborated on control cabinet units. Today their work together is primarily focused on automation technology. As marketing manager Richard Sims points out, "Siemens takes suggestions from users and integrates them into their development processes. A case in point is the six-channel thermocouple input modules with galvanic separation of



individual channels. In addition, it is important to us and our customers in over 70 countries to have support available on-site at all times. That is also why we need a global partner like Siemens." ■

info

www.sorg.de

JSJ Jodeit GmbH, Germany

Plant and Production Technologies

Since its founding in 1991, JSJ Jodeit in Jena, Germany, has followed the glassmaking tradition of the area where it is located. Today the company has operations throughout the world and provides customer support from initial design all the way to optimization of production for the entire lifecycle of its customers' glass-melting plants. JSJ Jodeit offers solutions for nearly all areas of glass production: batching and raw materials handling, glass composition, melting, and glass conditioning, as well as annealing and tempering. Opened in 2007, the company's Dresden site specializes in the planning and implementation of complete float-glass and container-glass production plants, including infrastructure and utilities.

Since 2009 JSJ has had its own department for the planning and construction of annealing lehrs, chemical and thermal glass treatment

plants, and customized equipment. JSJ has its own laboratory and technical center for carrying out scientific and technological research such as melting experiments and corrosion tests.

From the very start, JSJ has equipped its plants with process, measuring, and control technology as well as process visualization and power supply systems made by Siemens. JSJ cooperates closely with the Siemens glass division in Karlsruhe. "We see good prospects for joint development work in the future – for instance, intelligent solar glass factories with direct further processing of glass into finished solar panels," says JSJ founder and CEO Dr. Harald Jodeit. ■

info

www.jsj.de



Ernst Pennekamp GmbH & Co. OHG, Germany

Outstanding Products and Solutions “Made in Germany”

Founded in 1945, Ernst Pennekamp GmbH & Co. OHG in Ennepetal, Germany, is one of the world’s leading manufacturers of complete plant equipment units for handling and thermal processes. “Made in Germany” is still a sign of top quality around the world. That is why we continue to build our equipment here in Germany – from mechanical and electrical engineering to software programming to installation. Currently, an additional 3,000-square-meter production building is under construction,” explains CEO Thorsten Seidel.

Products offered by Ernst Pennekamp include equipment for hot-end transport and glass coating, as well as a wide variety of furnaces and furnace concepts for the thermal treatment of glass. Pennekamp plants are used in the production of container glass and tableware, float glass, display glass, and specialty glass. Over the past five years Pennekamp has also built plants for the



production of solar glass. Because of its excellent weather-resistant, mechanical, and optical properties, glass is an ideal material for solar energy applications.

Special technologies for glass transport and temperature control make it possible to increase efficiency while meeting the latest quality standards.

Pennekamp has been working successfully with Siemens in the area of process control and automation since the early 1980s. Originally this involved the first “simple” programmable logic controller (PLC) systems; today the company uses the very latest Simatic S7 and related add-on modules. “The good hotline service with highly qualified support staff is particularly beneficial for us,” says Seidel. ■

info

www.pennekamp.de

Solution Partner

Automation

SIEMENS



Zippe Industrieanlagen GmbH, Germany

A One-Stop Provider for Melting-Material Solutions

Alfred Zippe founded the Zippe company in 1920. Still family owned and managed today, the company has established itself as a key international player in the construction of batch-house and melting-material solutions. Exports make up 85 percent of its business, and the company has branch offices in 26 countries and customers in over 60 countries. Zippe is a one-stop solution provider, with services ranging from planning and design to the installation of mechanical and control technology equipment. In 2009 a new 1,600-square-meter technology center was opened. Process control systems and weighing and dosing computers control and monitor the fully automated

batching process. Networked Supervisory Control and Data Acquisition (SCADA) systems such as WinCC and process control systems such as PCS 7 provide the human-machine interface between the operators and the plant. Operators can manually set or modify batch recipes, material names, or monitoring times. The control system manages all data, summarizes it for reporting purposes, and makes it available for drill-down access by the enterprise resource planning (ERP) system.

For more than 30 years Zippe has been working with Siemens in the area of switching devices, drive technology, and automation systems – and the company

is now an official Siemens Solution Partner. Together the two companies have set glass industry standards for raw material handling and continue to work on further development.

“Moving forward, we can rely on support from Siemens in the development of holistic solutions in line with Totally Integrated Automation – based not only on technical innovation but also on licensing models geared to meet market requirements,” explains Franz Rhein, head of control system engineering at Zippe. ■

info

www.zippe.de

Zwiesel Technical College for Glass, Germany

Over a Century of Hands-On Vocational Training

Germany's oldest vocational training college for the glass industry was founded in 1904 by the city of Zwiesel and is still an institution of great renown within the glassmaking region today. Three modern vocational training institutes are united under one roof in Zwiesel: the Berufsfachschule für Glas, the Berufsschule für Glas und Optik, and the Fachschule für Glashüttentechnik und Optik prepare students for careers in the glass industry and precision optics. Established in 1957, the college's unique training and research glassworks is its most important facility.

About 400 students from German-speaking countries are introduced to the most recent glass-processing techniques and methods. Ongoing development is part of the college's strategy, as is demonstrated by annual investment totaling €1 million. More than half of this is contributed by the county of Regen, emphasizing the responsibility it feels toward the glass-manufacturing region. The school's board of sponsors maintains close ties with industry, regularly arranging seminars by and catering to specialists from engineering firms, universities, and industry. "Our vocational training college has to keep pace with the latest technology. Working closely with industry is indispensable for this," emphasizes school principal Hans



Glarfachschule Zwiesel

Wudy. Process automation is becoming more and more significant. To help in this area, Siemens sponsored the first Simatic PCS 7 control system. In 2006, UAS took over responsibility for installation and commissioning and maintains the technology at the school free of charge. The plant and a furnace were upgraded in 2009. Students who learn process control here will easily find their footing in a future profession. ■

info

www.glasfachschule-zwiesel.de

Siemens AG

Siemens glass expertise on the Internet Know-How Portal

Visit the Siemens glass industry Web site for detailed information about the industry-specific portfolio of Siemens products, systems, solutions, and services. The Web site highlights the benefits of the Siemens Glass Industry Suite: there the worlds of automation, instrumentation, analytics, information, and drive and energy technology merge to form a comprehensive and modular product portfolio, including all the services required over the complete lifecycle of a plant.

In addition to brochures and in-depth information, all the issues of *GlassFocus* magazine are available for download.

info

www.siemens.com/glass



■ Lifecycle services

A Unique, Comprehensive Offering

Siemens is able to deliver a comprehensive portfolio of services to a wide variety of users across all manufacturing and process industry sectors.

Whether to mechanical engineers, solution providers, or plant operators, Siemens offers comprehensive, structured product and system services and invaluable support during all phases of a machine's or plant's service life – from planning, implementation, and commissioning to maintenance and facility upgrades.

Rapid Web-based support

Online Support, a comprehensive service and support information platform, provides users with the help they need at any time from anywhere on the globe. Siemens Technical Support offers specialist support for function and handling issues. Technical Consulting provides users with highly qualified system expertise on project planning and design. Siemens Training specialists share their proven knowledge straight from the manufacturer, while Engineering Support provides support to interested parties throughout a project. Field Services offers worldwide, on-the-spot service in connection with commissioning and maintenance. The Siemens Spare Parts experts can rely on a global logistics network for supplying customers with replacements 24/7. Repair Services carries out repairs quickly and reliably as specified by the customer. Whether the focus is on implementing ongoing machine improvements and plant equipment optimization wherever possible or keeping all plant machinery state of the art, Optimization and Modernization Services offer support from planning all the way to operation. Finally, users can benefit from carefully selected and coordinated lifecycle services available from Service Programs.

Support functions at a glance

- ▶ Online Support
- ▶ Technical Support
- ▶ Technical Consulting
- ▶ Training
- ▶ Engineering Support
- ▶ Field Service
- ▶ Spare Parts
- ▶ Repair Services
- ▶ Optimization Services
- ▶ Modernization Services
- ▶ Service Programs

info

For more detailed information, please visit the Siemens support Web site or contact your service specialist.

<http://support.automation.siemens.com>



From lots of energy ...



... to less energy and more and more output.

Energy Efficiency

Increased energy and raw material costs, reduction of carbon dioxide levels, efficient resource usage, and environmentally friendly production – all of these demands are current trends in the glass industry. We understand these developments and are working on solutions for glass production and processing that result in increased productivity and energy-efficient production processes at the same time. Together with you we can optimize your plant, so that you can set new trends and standards. More information: www.siemens.com/glass
Setting standards with Totally Integrated Automation.

Answers for industry.

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