

what's up?

Totally Integrated Automation in the Solar Industry

2010

SIEMENS

Bright Prospects

With Totally Integrated Automation, only Siemens can supply a comprehensive line of products and systems for the integrated, cost-effective, and safe automation of solar systems.



Process Automation



Factory Automation



Field Applications



The solar industry is expanding rapidly, with experts expecting continued annual growth rates of 30 percent. The entrepreneurial spirit of the current era may still be a driving force, but rapidly growing international competitive pressure now requires greater standardization and optimization down to the last detail: only those who are well positioned and can satisfy expected demand affordably and efficiently have correspondingly bright prospects.

An important step toward meeting these requirements is an integrated system supporting monitoring, decision-making and control of key production processes. Totally Integrated Automation (TIA) from Siemens is the ideal basis for providing integrated customer-specific automation solutions for all segments of the value chain in the solar industry. The unique, holistic nature of TIA ensures the perfect interplay of all operational components,

creating the conditions for unmatched efficiency and flexibility.

TIA's system components range from process control and control systems (including distributed I/O devices) to motion control, industrial communication, human-machine interface, and sensor technology to manufacturing execution systems. At TIA's foundation is SIMATIC, the world leader in automation technology. Together with the SIMATIC PCS 7 process control system, SIMATIC forms the connecting link between enterprise resource planning (ERP) systems and factory automation. And with its modular design, the system will meet current and future demands – it flexibly grows with evolving manufacturing requirements. ■

Info:

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Crystal-Clear Benefits

Thanks to SIMATIC PCS 7, the solar glass line from Pilkington in Weiherhammer, Germany, is now even more efficient, cost-effective, and flexible – with considerably increased production capacity.

Pilkington (a member of the NSG Group) has completely modernized its solar glass line II in Weiherhammer. The existing process control system of furnace, float bath, and annealing Lehr was based on the Teleperm M process control system. Prior to the recent cold repair project, the system had already been expanded by adding a fault-tolerant SIMATIC S7-414H automation system for the cool-

ing circuit, also implementing the state-of-the-art SIMATIC PCS 7 process control system. Now, the operator systems for the furnace, bath, and annealing Lehr were replaced with SIMATIC HMI systems during the cold repair of the plant.

The distributed process control system ensures a consistently high quality of the float glass by monitoring the float process and guaranteeing that all parameters are

The SIMATIC PCS 7 process control system ensures the consistently high quality of flat glass from Weiherhammer

exactly maintained at setpoint values. Intelligent control routines help save energy and minimize emissions.

The three AS 235 automation systems for the line sections could be retained, while the OS (operator station) level was modernized. At the I/O level, some additions were necessary, as the line's capacity was increased from 550 to 810 tons of glass per day through a longer furnace and a higher melting performance, which was achieved by installing two additional burners that had to be integrated into the system. The project design specialists extended the software with additional measuring points and control circuits. The fuel and combustion supply to the now six burners and the rerouting processes are controlled by the furnace automation system. In addition to information on the cooling circuit, some 1,700 analog values and some 1,800 binary values are processed by the control system in total. The OS level comprises a redundant server and three control stations that the system operators use to control the float process. ■

Info:

www.siemens.com/glass

Dynamic Duo

SIMATIC PCS 7 is making a significant contribution to improving quality in the polysilicon production facility of the Chinese wafer manufacturer LDK Solar in Xinyu, in Jiangxi Province.

The collaboration with Chinese customer and partner LDK Solar on its factory in Xinyu is still a source of satisfaction at Siemens two years after it began. In March 2008, an agreement was concluded with LDK Solar to use the SIMATIC PCS 7 process control system in polysilicon production in Xinyu. The factory is considered a key project for LDK's expansion strategy, which, according to the company, achieved an annual output of 2 gigawatts from solar wafers in April this year and has thereby grown to become the world's leading manufacturer in this product group.

"LDK's planned efficiency increase does not rely only on an expansion of produc-

tion volume," explains Rainer Mahler from Siemens. "The optimization in plant availability achieved with the SIMATIC system will also make a further important contribution to increased quality." SIMATIC PCS 7 offers a large array of diagnostic functions for troubleshooting in complex automation systems, thereby helping to ensure the highest possible availability of modern industrial plants. Siemens has also been awarded the contract to supply 18 Maxum edition II gas chromatographs for the plant in Xinyu. ■

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The mobile panel can be used within the machine for teach-in of positions with active SLS

Easy Basics library and the SIMOTION Handling Toolbox. Extensive functions for monitoring the gantry system are also integrated in SIMOTION.

As the subject of safety is also becoming increasingly important in layup stations, Siemens' integrated safety technology was particularly attractive to Schmid. With Safety Integrated and PROFIsafe, both the amount of wiring in the control cabinet and the project planning period were considerably reduced. It was also possible to realize the Safety Limited Speed (SLS) function with just one absolute value encoder. Operation via the MP 277 mobile panel, used to control jogging, the positioning of individual axes, and so-called teaching in setup mode, also proved to be extremely convenient.

The excellent mutual spirit of cooperation between Schmid and Siemens also played a particularly important role in the success of the project. "At every step, I felt that we were all in the same boat," explains Gaspare Hilgner from Schmid. ■

Info:

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Stringing It Together

An ingenious motion control system with SIMOTION and Safety Integrated was planned, designed, and successfully tested in the new layup station at Schmid Technology Systems within a very short time frame.

Schmid Technology Systems GmbH is part of the Schmid Group, a leading manufacturer of integrated process solutions, including production processes in the solar industry. The engineers at Schmid Technology Systems worked in close collaboration with Siemens to develop the new layup station.

With its portal system, the layup station ensures an exact arrangement of the cell

strings on a glass plate with EVA foil and can handle a print area large enough to be used in 50-megawatt solar-cell production lines. SIMOTION with SINAMICS was used as the motion control system for the first time at Schmid. All positions and stations are archived in SIMOTION via various teaching routines. Multi-axis path interpolation was realized with the assistance of standard modules from the SIMOTION

Racing the Sun



Solar tracking units can increase solar energy yields by over 35 percent. One example is the biaxial tracking of Spanish photovoltaic systems controlled by SIMATIC S7-1200.

Photovoltaic systems operate most efficiently when the sun's rays hit the collector surfaces at right angles and there is no shadowing of the solar cells. Fixing the panels or modules on a movable support system equipped with robust tracking systems, however, enables maximizing solar exposure and, therefore, electricity yields.

The Spanish company Megasolar, part of the OPDE Group (together with Rios Renovables and Proinso), produces roughly 14,000 of these solar trackers annually. On a biaxial mounting structure of steel sup-

ports, modules from various manufacturers up to 90 square meters in size and with a peak output of 13 kilowatts can be flexibly deployed in the prefabricated frame. Data on the sun's movement are used in individual control programs whose parameters can be set for any location around the world.

With the distributed control of SIMATIC S7-1200 on every tracker, the units can follow the movement of the sun and also orient themselves in line with various climatic conditions. The control units determine the optimal irradiation coordinates

every day, ensuring that the sun's rays always reach the module surface at the angle permitting the greatest conversion of radiation. For this, the photovoltaic modules are rotated and tilted at the same time. All tracking movements within a solar farm are centrally visualized and monitored with an OLE for Process Control (OPC) server at a central station. ■

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Optimum Conversion Rates

Reliable, grid-friendly, economical: the SINVERT inverter family

A key component in field installation is the inverters. Siemens offers the right approach for all requirements.

In photovoltaic systems, direct current must be converted into alternating current, which is then fed into the power distribution network. As a result, the choice of an inverter acquires great importance in achieving maximum system yield and transforming the electricity most efficiently. SINVERT solar inverters feature an efficiency of over 98 percent, a top performance ratio, simple installation, and low service and maintenance costs. They are also extremely robust and durable.

The three-phase grid feed-in system with additional components – from system planning and monitoring to medium-voltage components – shows its strengths in medium-sized systems from 10 kilowatts and up, as well as in large systems and solar power plants from 500 kilowatts to the megawatt range. Siemens offers SINVERT PVM inverters with a power range of 10 to 20 kilowatts for the commercial segment. For the power plant segment, there is the highly efficient SINVERT PVS for power ranges from 350 kilowatts to 2 megawatts.

A Long Search Is Finally Over

Kemper Solar GmbH and Gehrlicher Solar AG are two of the many companies

that have selected SINVERT PV inverters. In Vreden, Germany, Kemper invested in a solar farm featuring 20 free-standing mounted photovoltaic systems with their own tracking systems and connected it to the grid in late June 2010.

The demonstration and test system is due to achieve a total peak power output of up to 250 kilowatts. The five SINVERT PVM10 inverters used are contributing to this. “These components are outstandingly suited to outdoor deployment on the tracker mast with their protective housings and integrated communication, and they deliver high output,” says project manager Alexander Lenfers, explaining the choice. “We have long been looking for inverters with these features.”

In late December 2009, Gehrlicher Solar AG completed an outdoor photovoltaic system at Rothenburg airfield in Germany. A solar farm with a total peak power out-

put of 21 megawatts was erected on 68 hectares. Siemens supplied 11 container units for the solar power plant. For the first time, the SINVERT TL series without a low-voltage transformer was used, as it is particularly well suited to deployment in large photovoltaic systems. ■



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