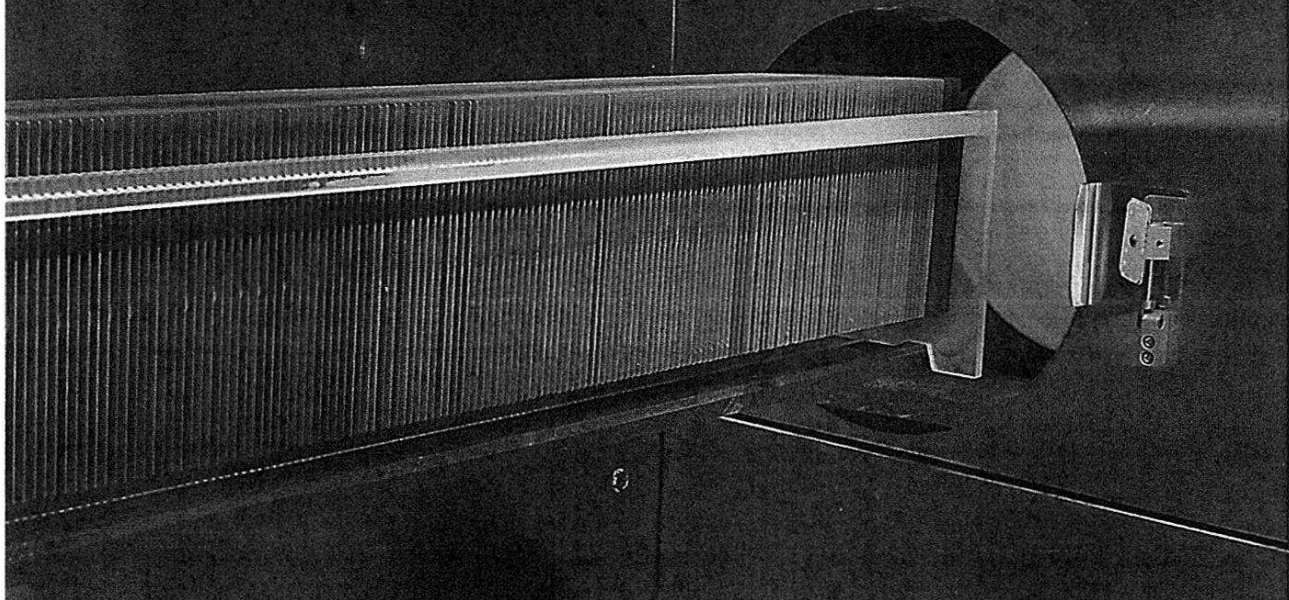


Fig. 1: Key process: upon phosphorus diffusion, i.e. introduction of phosphorus atoms into the semiconductor, the solar cell becomes electrically conductive. The furnaces for this process come mainly from Germany



Picture: Solarworld

## KEEPING A STIFF UPPER LIP

**Machine Manufacturing Sector Continuing to Rely on Photovoltaics** The worldwide stop in production capacity extension for solar modules is proving to be a heavy burden for the solar machine manufacturers. Nevertheless, no company wants to quit the photovoltaics sector, because the solar energy market is already set to pick up again in the medium term. Until this happens, the equipment suppliers are strengthening other sources of sales and income.

**T**hat sounds like hard times. For 83 % of the photovoltaics (PV) suppliers in Germany the order situation has worsened compared to the previous year. That is why the companies are expecting an average sales decline of over 20 % in 2012. This in turn is having a negative effect on employment. Almost two thirds of companies are making use of short-time working. The current business climate survey conducted by the German Engineering Federation (Verband Deutscher Maschinen- und Anlagenbau – VDMA)

leaves us in no doubt: in just a few months PV machine manufacturing has gone from order boom to sales crisis.

“The investment readiness of the cell and module manufacturers has noticeably declined,” explains Eric Maiser, Executive Director of the Photovoltaic Production Aids platform within the VDMA. On the one hand the manufacturers have developed clear surplus production capacities and analysts estimate that in 2012 around 30 GW of PV output will be installed worldwide – in the context of global production capacity of 50 GW. On the other, the trend in key PV installation markets is uncertain. Many countries with solar energy feed-in charges have in some cases drastically reduced their subsidy tariffs because growth in the number of installations was getting out of control. For

the world’s largest solar market, Italy, for example, the experts are this year expecting an expansion of only 2 GW – that would correspond to a market decline of three quarters compared to 2011.

On top of this, there is the fact that China, the main sales market for European suppliers, is gradually establishing its own powerful solar machine manufacturing market. For that reason the Europeans can no longer do business there as easily as previously. “The technological independence of foreign companies should be reduced to a minimum in China,” explains management consultant and China expert Frank Haugwitz. Within the framework of the current 12th five-year plan (2011 to 2015) implemented by the Chinese government, photovoltaics is right at



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the top of the political agenda. "Therefore considerable financial funds are being made available for solar energy, especially for plant construction and new cell types," says Haugwitz.

### Less Demand in China

Despite the current problems, the machine manufacturers are remaining optimistic. Solar crisis or not – in two to three years the PV market will pick up once again, believes Jürgen Weiss, head of marketing at German special machine manufacturer Gerold. "The prices of solar modules are falling dramatically, so that photovoltaics is approaching

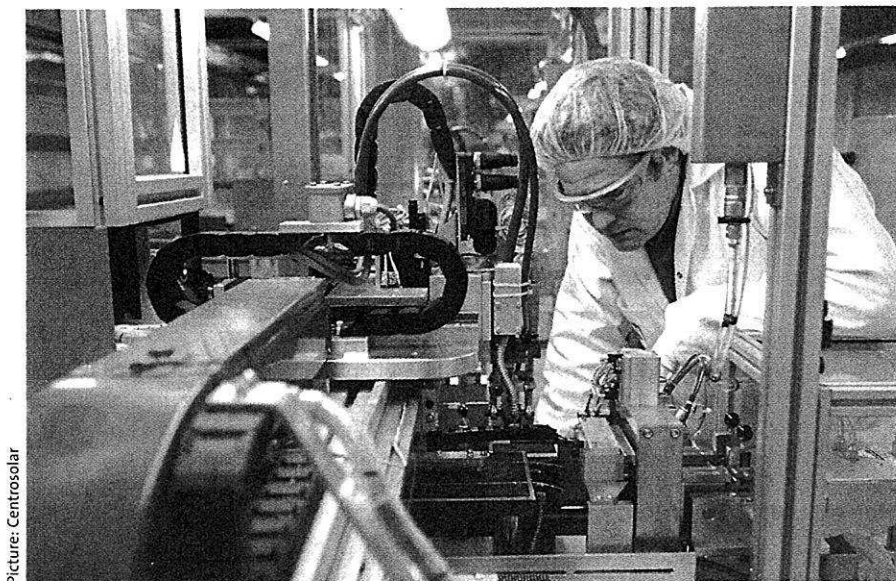
## Machine manufacturers remain optimistic despite many current problems

competitiveness in many parts of the world," says Weiss. Growth will no longer occur predominantly in Europe, where subsidy cuts are taking their toll, but in new markets in Asia and the US.

Gerold builds material-handling systems and process facilities for the production of crystalline silicon and thin-layer modules: these include stations for panel framing, edge sealing, and trimming. In 2011 the company from the Lower Rhine generated three quarters of its turnover in the solar technology sector. This share will probably shrink to half this year, estimates Weiss.

Gerold reflects the mood of most solar machine manufacturers: they clearly feel the slump, but are continuing to bank on PV. In recent years, the German supplier Primus Centrotherm for example generated more than 80 % of its annual sales in the Far East and is suffering badly from the factory construction stop in China. In 2011 the company had to contend with an operating loss of €19.8m. Nevertheless, head of technology, Peter Fath, believes in a positive turn-around. We are working flat out on solutions, which make photovoltaics competitive with conventional energy sources", says Fath. In this connection he said that Centrotherm was focusing both on innovative machine and production concepts as well as on compliance with the highest quality and environmental standards.

The East German company Jenoptik Automatisierungstechnik, a specialist in the manufacture of laser machines for the production of thin-layer modules, also believes there will be a quick end to the consolidation phase in the PV market. "The growth rates in the area of CdTe and CIGS technology are putting us in a confident mood," says Jenoptik Product Manager Gabriele Eberhardt. CdTe and CIGS stand for thin-film modules on the basis of semi-conductor cadmium-telluride along with copper, indium, gallium, and selenium. Jenoptik is offering two laser facilities aimed



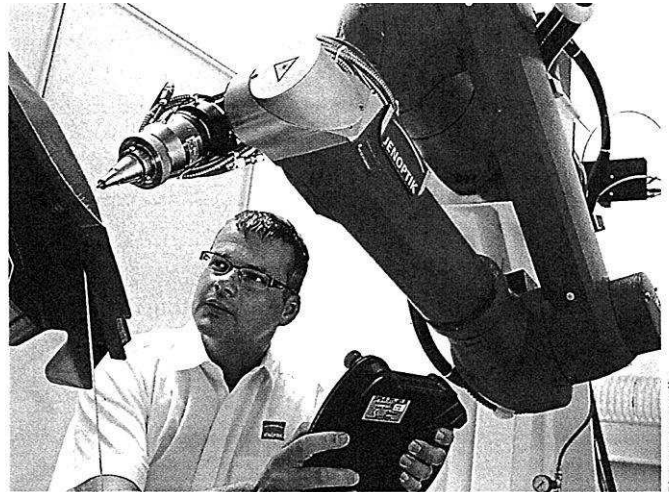
Picture: Centrosolar

Fig. 2: Spectators only: thanks to rapid technical advances by the solar machine manufacturers, the production process for solar cells is today a fully automatic one for many manufacturers



Picture: DLK

**Fig. 3: New source of income: solar electricity must be stored for an intelligent energy supply. Machine manufacturers have therefore also been recently researching into batteries**



Picture: Jenoptik

**Fig. 4: Versatile applications: it is now impossible to imagine solar production without lasers. The latest technology handles several process cycles within the shortest time**

at further efficiency improvements and cost reductions: "Jenoptik Votan Solas" enables us to strip the coating from the edge of modules in all sizes and cut it to length, "Jenoptik Votan Multi Solas" can even be used for all structuring processes in the CIGS sector. In the production of thin-film modules conductive and photoactive layers are gradually applied to synthetic material or glass. After each individual coating, the surface is structured. This process leads to the creation of individual cells and their transformation to modules.

### Solar Energy Storage – New Source of Income

"No one wants to shut down the solar energy sector," as is also emphasized by VDMA expert Eric Maiser. "We assume that the international markets will pick up once again and also that the retrofitting business will become increasingly significant," says Maiser. Moreover, in order to get through the crisis, the companies could also build on other sectors. "Only a few companies exclusively manufacture machines and components for the solar industry," he explains.

Gerold for example is once again focusing increased attention on its core business, equipping the automobile industry with glass machines. Major market-leading solar equipment suppliers such as Italian glass specialist Bottero, Centrotherm, or Meyer Burger from Switzerland are relying on tried-and-tested sectors. At Centrotherm the semi-conductor and micro-electronics sectors, which led to the creation of the

company in the first place, are helping to reduce the company's dependence on solar energy. Saw specialist Meyer Burger in turn is compensating for cuts in its solar energy business in particular through the expansion of its opto-electronics business, in other words separation technologies, which, for example, process glass for manufacture into prisms.

Jenoptik in turn is also opening up new areas of activity. Since the end of last year, the company in Jena has been offering laser systems for the manufacture of high-tech glass for energy-sav-

ing the appropriate production machines for this purpose, such as for example the southern German equipper Schmid. According to its spokesman, Christoph Kübler, the company is conducting research into liquid-phase energy storage for various areas of application such as PV, electro-mobility, and the health service.

At the Energy Storage conference, which Messe Düsseldorf staged in cooperation with the Berlin know-how provider Solarpraxis in spring 2012, one thing already become clear: energy storage units are top of the agenda for the future. Germany's energy turnaround has already led to an increased share of renewable energies. To ensure that solar and wind power is not fed uncontrolled into the sensitive electricity

### "No one wants to shut down the solar energy sector"

**Eric Maiser, Executive Director of the Photovoltaic Production Aids platform within the VDMA**

ing "smart windows". These windows can be electronically adjusted to the external lighting conditions. As a result, the users can regulate light incidence and the room temperature themselves, thus controlling their own energy consumption. As the production of the high-tech glass is similar to that of the thin-film manufacturing process, Jenoptik can offer the same laser technology for this process.

Maiser recognizes a further trend among the suppliers. "An increasing number of our members are entering the storage technology business." The companies have developed their own storage solutions for solar energy and

networks on very sunny or windy days, the surplus eco-energy must be stored in the interim for periods of high demand. This is made possible, for example, by using large pump storage units, the conversion of eco-electricity into hydrogen and methane using electrolysis and methanization, respectively, as well as batteries. "Anyone who is placing their faith in storage technology, definitely has positive prospects," says Maiser. ■

#### CONTACT

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