Press Release

Advanced cSi production technology of Manz achieves 20.5% efficiency on PERC solar cells

German cSi manufacturing solution enables large-scale production of high-efficiency solar cells at lowest Cost of Ownership

- **Manz has successfully reinforced its expertise and leadership as technology provider for the production of PERC solar cells**
- **Upgrade of existing production lines with technology of Manz to convert them into production lines for PERC solar cells.**
- **CEO Dieter Manz "With 25 years' of experience in the solar industry, virtually all major cell manufacturers are among our customers."**

Reutlingen/Shanghai, 20 May 2014 --- To meet global market's soaring demand for high-efficiency solar cells and lower manufacturing costs, Manz AG offers industry-leading solutions for crystalline solar-cell (cSi) production which yields high conversion efficiencies of up to 20.5%. With its advanced technology, Manz has successfully reinforced its expertise and leadership as a technology provider for the production of crystalline solar cells. Its cSi manufacturing solutions will be showcased at SNEC 8th International Photovoltaic Power Generation Conference & Exhibition (SNEC PV) 2014 in Shanghai, May 20-22, 2014.

The new-generation production technology deploys Manz's VCS 1200 vertical vacuum coating system to deposit dielectric passivation layers on the rear of cells, together with the firm's LAS 2400 laser ablation technology, enabling cell manufacturers to achieve large-scale production of high-efficiency cSi solar cells at lowest Cost of Ownership. The fully automated and maintenance-friendly tools boast a smaller footprint and improved efficiency over competitors' systems. They can be used for both mono- and multi-crystalline solar cells. Manz thus offers customers the necessary equipment and processing technology to convert standard cell production lines to manufacture the higher-efficiency PERC cells.

Manz's VCS 1200 system uses a completely new technology for vertical processing, with a throughput of 1,200 wafers/hour. Thanks to its powerful plasma source and a new carrier system, the coating process leaves no pin marks or flakes on the wafers – a problem of many competitors' systems. In addition, VCS 1200 enables single-side deposition of PECVD-layers without wrap-around of deposition on the other side. Manz's high performance PECVD process technology achieves optimum reproducibility and the industry's highest degree of cell efficiency and uniformity. A quick-change cleaning concept minimizes downtime because it enables cell manufacturers to clean the process chamber and carriers outside the machine. Different with competitors' systems, VCS 1200 deposits dielectric passivation layer in only one single system. The system is very maintenance-friendly and easy to integrate into existing cell production lines, resulting in the industry's lowest cost of ownership for front side and back side coating, as well as for carrier cleaning.

Alongside the VCS 1200 system, Manz's LAS 2400 laser ablation system provides a simple, precise and high-throughput solution for local contact opening of rear side passivation layers.

Being a one-stop process, laser ablation offers the lowest cost of ownership for this step in cell production and offers safe wafer handling with the industry's lowest breakage rates. The LAS 2400 system uses a modular, small-footprint design that is well suited to upgrading existing production lines. It provides gross throughput of 2,400 wafers per hour, in spot widths ranging from 30 to 100 µm.

Complementing the VCS 1200 and LAS 2400 production tools, Manz also provides an industry-leading wet-chemical tool, the IPSG CEI 4800, which removes the highly doped layer from the rear and edges of a wafer, thereby producing chemical edge isolation (CEI). In a second step, it also removes the remaining phosphor silicate glass (PSG) layer on the front side of the wafer that was created during the earlier diffusion process. IPSG CEI 4800 provides minimum breakage rate due to the application of soft sponge rollers concept with minimized mechanical stress on substrates.

"China is the world's largest producer of solar cells, as well as one of the largest consumers, and Manz is proud to be associated with the country's success in this field," said Dieter Manz, CEO of Manz AG. "We have 25 years' of experience in the solar industry, and virtually all major cell manufacturers are among our customers. With our passion for efficiency, we continually innovate to stay ahead of our competitors and SNEC PV 2014 gives us the ideal platform to demonstrate our latest technologies. Manz is deeply committed to our relationship with China and to our growing customer base here. In 2012 we opened a 20,000 sq m manufacturing plant in Suzhou and we currently employ some 900 people in Asia, nearly half of all our employees. We will continue to invest in China, and work with our local business partners to improve the quality and cost-effectiveness of their solar cell production lines."

In the photovoltaic industry, Manz focuses on processes and solutions for manufacturing crystalline silicon solar cells, and manufacturing thin-film solar modules. In the cSi sector, Manz provides processes and equipment for metallization, laser processing, wet chemistry, and vacuum coating as well as automation solutions and test and inspection expertise.

Company profile:

Manz AG – passion for efficiency
Manz AG, headquartered in Reutlingen, Germany, is one of the world’s leading high-tech engineering firms. Founded in 1987, in recent years the company has grown from an automation specialist into a supplier of integrated production lines. Manz has expertise in six fields of technology: automation, laser processes, vacuum coating, screen printing, metrology, and wet-chemical processes. These technologies are used and developed in three strategic business areas: Display, Solar, and Battery.

The company, led by founder Dieter Manz, has been listed on the stock exchange in Germany since 2006, and currently develops and manufactures in Germany, China, Taiwan, Slovakia, Hungary, and Italy. Manz also has sales and service offices in the United States and India. At the beginning of 2014, Manz AG had approximately 1,850 employees, half of them in Asia.

With its slogan, “Passion for Efficiency”, Manz is making a promise to offer its customers – all companies active in important future markets – increasingly efficient production equipment. As an engineering firm, the company plays a significant role in reducing the cost of manufacturing end products, making these products available to large groups of buyers worldwide.

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