

## Shanghai Electric and the Manz Group join forces in solar technology development

Pooling of resources will create a win-win in China

May 25, 2016 (Shanghai, China) The Manz Group a globally active high-tech equipment manufacturer and Shanghai Electric, the leading power and electrical group in China, have reached a strategic partnership agreement. Through acquiring shares in the Manz Group, Shanghai Electric has become one of the company's major investors and will support Manz in developing advanced technologies in the areas of energy storage, electronics and solar power.

Shanghai Electric will leverage its resources to help Manz in developing technology in key segments, including CIGS thin-film solar technology. The current priority for the two firms is to create value locally by pooling their resources and providing exclusive access to Manz's advanced technology.

"Manz has been widely recognized in the global market. Our exclusive collaboration with the ZSW<sup>1</sup>, leading research institute in CIGS technology, our extensive experience in mass production and unique technologies developed by our engineering team have made us a highly sought-after partner, not only in the CIGS solar segment. With the investment, business insights and resources from Shanghai Electric, we are in a great position to help Chinese customers to improve CIGS module efficiency and manufacture them locally," said Dieter Manz, CEO of Manz Group.

According to the 13th Five-Year Plan for Economic and Social Development of the People's Republic of China, there will be a year-on-year growth of 15-to-20 gigawatts of power generated by solar photovoltaic technology in China from year 2016 to 2020. The country has achieved the highest PV power generation growth rate in the world to date.

Solar energy has become one of the most popular renewable energy sources in the twenty first century. As such, development and use of solar energy has been identified by the Chinese government as a key strategy in the country's sustainable development. The government is openly encouraging the solar photovoltaic industry to cooperate with overseas suppliers to enhance their technological capabilities.

The Chinese government has established three parameters with regard to innovation progress in photovoltaic technology – namely percentage of local production, efficiency of mass production and power generation cost per kilowatt-hour. Manz has already demonstrated that production costs of 2.5 RMB/W and OPEX of 0.35 RMB/kilowatt-hour are absolutely realistic and can be achieved with the Manz CIGSfab<sup>2</sup>.

The challenges that China currently faces in CIGS technology include weak infrastructure, absence of a national research platform and lack of technological know-how. The photovoltaic industry cannot thrive without reducing those gaps. With Manz's over 40-years of experience and advanced production technology, such obstacles will be overcome once the company sets up its CIGSfab in China.

"With our core CIGS intellectual property and technology, we are the perfect partner for local value creation. Aligned with the Chinese government's "the Belt and Road" economic initiative,

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<sup>1</sup> ZSW is the Baden-Württemberg Center for Solar Energy and Hydrogen Research.

<sup>2</sup> CIGSfab is a fully integrated turnkey production line for manufacturing CIGS thin-film modules.

the partnership of Manz and Shanghai Electric will increase the cooperation in the photovoltaic industry between China and overseas markets,” said Manz.

The Manz Group is the world’s only provider of a fully integrated, turnkey production line for CIGS thin-film solar modules. The exclusive partnership allows Manz to access ZSW’s record-breaking 22 % CIGS efficiency on cell-level to enhance the potential of CIGS technology in China.

Manz maintains an innovative “CIGS*innoline*” production line that enables the company to run tests on new materials in an environment similar to customers’ factories before they place an order. The goal is to increase efficiency while decreasing production costs at the same time.

In addition, Manz’s IP and technology can help Chinese customers to run a stable process 24/7, enjoy the highest yield and efficiency, upgrade their manufacturing capability and maximize module efficiency.

Choosing Manz means selecting a strong and reliable partner. Advantages of the Manz CIGS thin-film technology are:

- **Lowest production costs of 2.5 RMB/W:** Manz has demonstrated that production costs of 2.5 RMB/W are realistic and achievable with the Manz CIGS*fab*.
- **Highest efficiency in mass production:** The Manz CIGS*fab* has an average guaranteed module efficiency of 14.6 % today, making it the currently most efficient (module and aperture area) turnkey line.
- **Significant potential to increase efficiency:** Manz’s R&D partner ZSW achieved record cell performance with an efficiency of 22 % on rigid substrates, and Manz’s record panel delivers a module efficiency of 16 %.
- **Internal Rate of Return (IRR) over 15 %:** As a technology leader, Manz offers a secure investment with maximum profitability.

With these advantages, Manz can help Chinese customers to significantly reduce cost and create value locally by:

- Using local materials
- Reducing the cost of producing and setting up manufacturing equipment
- Manufacturing in facilities in China
- Increasing integration within the production process
- Establishing a knowledge system among local engineers and operators

The investment of Shanghai Electric is an outstanding push for Manz’s development in key technological areas. Interested parties can learn more about Manz’s advanced CIGS technology by visiting its booth (#535, Exhibition Hall E3) at the SNEC PV POWER EXPO 2016.

### Company profile:

#### **Manz AG – passion for efficiency**

As a globally active high-tech equipment manufacturer, Manz AG, based in Reutlingen, Germany, is a pioneer for innovative products in fast-growing markets. Founded in 1987, the company has expertise in seven technology sectors: automation, laser processing, vacuum coating, screen printing, metrology, wet chemical and roll-to-roll processing. Manz deploys and continuously develops these technologies in three strategic business segments: Electronics, Solar and Energy Storage.

The company is led by founder Dieter Manz and has been listed on the stock exchange in Germany since 2006. It currently develops and produces in Germany, China, Taiwan, Slovakia, Hungary and Italy. It also has sales and service branches in the United States and India. Manz's claim "passion for efficiency" offers the promise of production systems of the highest efficiency and innovation to its customers in dynamic, future-oriented industries. With its comprehensive expertise in developing new production technologies and related machines, the company contributes substantially to reducing production costs for end products, making them accessible to large groups of buyers the world over.

### Contact:

Manz AG  
Axel Bartmann  
Tel.: +49 (0)7121 – 9000-395  
Fax: +49 (0)7121 – 9000-99  
E-mail: [abartmann@manz.com](mailto:abartmann@manz.com)

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