

Press Release

- **GEROLD and 4JET introduce integrated solution for thin film module assembly**
- **Edge deletion, molybdenum exposure and bus bar contacting**

Nettetal/Alsdorf, April 14, 2009

German machine suppliers Maschinenbau GEROLD GmbH & Co. KG (Nettetal) and 4JET Sales+Service GmbH (Alsdorf) offer an integrated solution for edge deletion and contacting of thinfilm solar panels.

4JET is responsible for laser based edge deletion and the mechanical exposure of molybdenum coatings on CIGS panels, while GEROLD provides fully automated solutions for bus bar contacting. These are either based on glueing, soldering or welding technologies.

The sequentially operating production cells are designed for panel sizes of up to 2200x2600mm [7.2x8.5 ft.]. The individual solutions are already being used by suppliers of a-Si, CdTe and CIGS thin film panels.

The individual steps:

Molybdenum Exposure

This step is needed during the production of CIGS panels and exposes the molybdenum layer on the glass by removing the semiconductor and TCO layers with a precise and low-wear tool. The bus bar zones typically are a few millimetres wide and positioned alongside the short or long edges of a panel. They are exposed with 4JET's proprietary MEX tool heads, that allow a more material friendly and precise processing than conventional technologies such as blasting or brushing. Using several MEX heads in parallel allows to reach typical cycle times in modern CIGS manufacturing lines.

Laser Edge Deletion

This process is performed either by 4JET's robot based or INLINE systems. A short pulsed laser removes the entire coating in order to create a high G-Ohm isolation on the glass panel's edges.

Bonding

For the bonding process, GEROLD offers the three most common processes: Glueing with silver paste or adhesive tape, ultrasonic welding, or soldering. The bus bars can be applied with a precision of +/- 0.1 mm. Process speeds typically reach 50mm[2"/]s.

4JET and GEROLD have engineered the value-add-production cells to offer customers a total solution that eliminates frictions between mission critical production steps.

About GEROLD

Maschinenbau GEROLD GmbH & Co. KG, based in Nettetal/Germany, is a globally engaged automation specialist.

GEROLD provides robotics & automation for best frontend / backend utilization. Hence, GEROLD offers cost-effective, self-contained production cells, modularly designed to reduce factory footprint. Furthermore, custom-built, efficient PV-module fabrication lines are a GEROLD hallmark.

The unique engineering know-how is backed by the activities under its product line 'Automotive Glass', where GEROLD realizes production lines for OEM-automotive glass manufacturers. The company, established in 1968, has been successfully providing PV-tested integration skills with its 'Photovoltaics' product line for several years.

Further information: www.gerold-mb.de

About 4JET

4JET develops and manufactures laser systems for treatment of technical surfaces. Since its foundation at the beginning of 2006 the company has quickly grown to become the leading supplier of laser systems for edge deletion. The company also supplies laser equipment for other industrial surface treatment applications and manufactures pulsed CO₂-lasers for surface cleaning. Since 2007 4JET is cooperating with Mitsubishi International GmbH, a subsidiary of Mitsubishi Corporation (Tokyo) for international distribution of its products.

In the Alsdorf based company a team of physicists and engineers develops laser process technology as well as turnkey manufacturing equipment for industrial use. In March 2009 4JET was elected Germany's most innovative young company of 2009 under over 200 companies in the national GrunderChampions contest. Since April 2009 the company operates from a new facility in Alsdorf near Aachen, Germany.

Further Information: www.4JET.de

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