



News Release

Solar modules produced in a 10-second cycle

Robotic systems for trimming, taping, and framing

SAN FRANCISCO, July 12, 2011 — Kuka Systems increases the pace in the production of crystalline photovoltaic modules. Trimming, taping, and framing functions are provided by fully-automatic robotic systems. Taping is now carried out “on the fly.” Festo proportional pneumatic technology ensures that the contact pressure of the tape roller is correct. Visit Festo at Intersolar North America booth #9557.

By integrating Kuka robots into the production process for photovoltaic modules, the Energy Solutions Division of Kuka Systems ensured a high degree of utilization of the robot. The results of this development by Kuka Systems are fully-automatic, turnkey photovoltaic production lines for a million solar modules per year.

Robo Trim

“Kuka Robo Trim” is the name of the robotic cell that removes projecting laminate film and prepares modules for framing. This robotic edge-finishing station offers great potential for rationalization, as it eliminates the manual work required with conventional production lines. The robot uses a pneumatic gripper to guide the laminated photovoltaic modules through the trimming station and to prepare the modules for the subsequent process steps of “taping” and “framing.”

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Robo Tape

The “Kuka Robo Tape” station automatically applies tape and sealant to the glass, trims the tape precisely, and removes excess material. Festo pneumatic drive types ADN, DFM, DSNU, and DZF are used to feed, guide, and control the tape rollers.

One ground-breaking feature is the robot-mounted tape head, which has a cycle time of 10 seconds and thus enables the robot’s capacity to be optimally used. The tape head travels along the photovoltaic module and works in time with the machine cycle to apply tape on the fly to the solar modules as they pass by. The roller contact pressure is controlled by a proportional valve VPPM on a valve terminal CPX/MPA.

Pneumatics in very small spaces

This proportional valve from Festo ensures precision and allows operation in accordance with individual acceleration and pressure ramps. The variable flow rates provided by the proportional valves enable the cylinder pressures to be adapted to the needs of the production process. The CPX terminal offers fieldbus and Ethernet interfaces, facilitates easy on-site commissioning, and provides a pressure display and diagnostic functions thanks to visualization at field level or production control systems. Pressure values and all diagnostic data – from upper to lower limit values – can be remote-controlled and monitored via a fieldbus.

Proportional technology is thus able to exploit the advantages of the Festo CPX environment. Remote control and remote diagnostics can be carried out as desired via a web monitor, e-mail, or SMS alarm. The tape head is an example of how easily pneumatic functions can be integrated within a very small space directly on the robot arm.

Robo Frame

In the next station of the fully-automated production line, framing is carried out using “Kuka Robo Frame.” “We have for the first time managed to integrate the frame press directly on the robot,” explains Elisabeth Schärfl of the Solar Technology Sales and Engineering department at Kuka Systems. “That way, we avoid deformation and scratches and thus increase quality in comparison with a standard frame press. In addition, we can increase the degree of utilization of the robotic system.”

With “Robo Frame”, the robot grips the laminate on the glass side and guides it precisely into the prepared frame sections. Festo pneumatic drives, valves, and vacuum grippers hold the laminate securely. The robotic station adds the frame sections in four working steps after they have been fitted with corner connectors. Thanks to additional clamping and a flat support surface, the forces acting on the laminate as the frame sections are joined together is minimal, thus avoiding deformation. The double frame section feeder means that no relative motion is created, which prevents scratching of the profiles.

Scalable automation

The joining forces that can be achieved – 1.2 tons –compare to those with a conventional frame press. The process is not limited to the use of double-sided adhesive tape, which means that other methods of sealing can also be used. The flexibility of the Kuka robot enables it to be combined with other automation functions, allowing a machine to be scaled, for example, for production lines with an annual output of 50 or 100 MW.

For sales information call Festo at 800-993-3786. Visit

www.festo.com/us and www.kuka-systems.com

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Festo images

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Caption to illustration: The advanced tape head attached to the robot is a ground breaking feature; with cycle times of 10 seconds it optimizes utilization of the robot.

Please refer to: Festo press photo
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Caption to illustration: The robot's end effector travels along the photovoltaic module and applies the tape to the passing solar module on the fly in time with the system.

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Caption to
Illustration

The necessary roll application pressure is controlled using proportional valve VPPM connected to a valve terminal CPX/MPA. This proportional valve from Festo ensures the necessary precision in the process and makes it possible to navigate individual acceleration and pressure ramps.

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Caption to
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In Robo Frame, the robot grips the prepared laminate on the glass side and inserts it accurately into the supplied frame parts.

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Journalists write to the Festo Marketing Manager marketingmgr@us.festo.com for additional information and for access to high resolution images.