Automated Production of Solar Module

ABB clean room robots help meet growing solar module demand

With solid growth, the solar energy industry is developing into an extremely promising global market. The manufacture of products to meet this demand is being made possible with the introduction of high-performance, flexible robot automation, adapted to the special requirements of the photovoltaic industry. We explain how Schiller Automation GmbH & Co. KG is using ABB’s robotic technology to meet the ever-increasing demands of the industry.

Schiller Automation GmbH & Co. KG in Württemberg, Germany has specialised in automated technology for over 30 years, providing consultation, production, assembly, service and support to its customers. Schiller is now applying its know-how to the photovoltaic market, providing automated systems specifically designed for solar module production. In 2006, Schiller’s photovoltaic technology sales barely amounted to 24 per cent of its gross income. In 2008, Schiller expects a gross income of over 52 million Euros, of which 73 per cent alone will come from its photovoltaic activities. Although Germany is regarded as the key driver in the photovoltaic market, accounting for 63 per cent of the market in 2007, European countries (32 per cent) and the USA provide interesting opportunities.

ABB robotic technology

In developing an automated system for photovoltaic cell production, Schiller’s engineering department was tasked with quickly finding a suitable robotic solution on the market. According to Schiller project leader, Bernhard Früh, the robots had to fulfil strict clean room requirements (ISO Class 5), with no risk of any contamination of the photovoltaic modules which could affect their performance. As an added challenge, they also had to be capable of quickly and precisely handling the solar modules. With each cell covering an area roughly one and a half square meters with a thickness of just three millimeters, it was essential for the robots to be able to handle each unit without breaking them.

With a diverse range of flexible technology options proven across a range of industries, ABB’s robots were seen as the solution for Schiller’s requirements.

The cleanroom environment

Modified versions of ABB’s new IRB 6640 have met all of the technical requirements set by Schiller. To make them suitable for clean room use, the robots have been coated with three special films of varnish, primer, white lacquer and clear finishing coat. Screws and inspection inlets are covered with plastic casing to enable easy cleaning. Cables are partially laid in closed cable drag chains, to keep them in order and enclosed, pre-
vent the “invisible” abrasion of cables. As an added precaution, the robots are also subjected to a rigorous pre-delivery cleaning and packaging process. Before delivery, the clean room robots enter a special cleaning process and are packed in double film. Upon delivery to the customer, the first layer is removed in the antechamber to the clean room to leave any contamination there. The second film is only taken off in the clean room.

**Improved production**
The requirement for precision handling of the cells has been met by ABB’s Quick Move and True Move technology, which enable users to achieve up to 50 per cent better path performance and a 20 per cent reduction in cycle times without compromising quality.

To date, Schiller has taken delivery of more than 60 ABB clean room robots per year for solar module production. Simplified programming and flexibility mean these robots can be easily adapted to specific situations in the production process without expensive construction and development work.

To ensure Schiller’s staff are confident and capable in supporting the robots, the ABB Automation training centre in Friedberg provided comprehensive training for all plant employees, with special briefing sessions to help them maintain the cleanliness of the clean room robots.

The ability of ABB’s robots to help manufacturers to add to their bottom line whilst improving the quality of their products has now been proven in various customer applications. Schiller customers who are now using ABB’s clean room robots have reported a demonstrable increase in the efficiency and effectiveness of their production processes.