

March of the robots felt in photovoltaic circles

Robots working alongside their human colleagues on a variety of production lines are now an everyday sight, and the [photovoltaic industry](#) is taking notice of the lower costs and shorter production times that the use of [robots](#) in industry brings. In this article, [Rüdiger Winter](#), of [German company Adept Technology](#), a global, leading provider of intelligent vision-guided robotics systems and services, examines how robots are [the perfect solution](#) to a sector which seems to be in a permanent state of development and change.

As in many other sectors, the trend towards automation in the photovoltaic industry is unstoppable. The only way for the industry to be successful along a wide front is by permanently lowering its production costs.

The photovoltaic industry already has a potential that not only warrants, but positively encourages, the use of automation technology. Using industrial robots brings shorter processing times, lower wage costs, less breakage and therefore higher cost effectiveness. In recent years, most manufacturers who have invested in this technology have done so with great success.

But many of the robotics systems still in use today lack the most important of the five human senses, the ability to 'see'. The number of tasks that a 'blind' robot is precluded from performing is obvious. A 'seeing' robot can flexibly pick up, recognise and measure wafers, solar cells and even whole modules and then place the gripped objects with great precision and speed.

Back in the 1980s, the food industry was already reaping the benefits of integrated image processing by using Adept robots for its packaging and sorting applications. Even then, pastries, chocolates and rolls were being picked and sorted along a conveyor belt. The object and position recognition functions this requires, as well as synchronising the robot with the moving object, are some of the strengths that Adept Technology has constantly redeveloped over the years.

The key factor has been the integration of image processing and robot control into one logical unit. Each function can access all the data it needs from other functions at any time and in the space of a few milliseconds. The camera focus of the image processing is calibrated to the robot's coordinates system internally. The complex and inflexible communication protocols required by most external systems are virtually eliminated.

Adept is still the only manufacturer of robotics systems with integrated image processing. Around 9,500 of the 25,000 Adept systems so far installed are equipped with Adept image processing.

There is hardly another sector in which change and innovation take place at shorter intervals than in the photovoltaic industry. The dimensions of cells and modules are constantly changing. Wafers are being made ever thinner to save on precious silicon. The necessary processing steps are continually evolving and manufacturers now have to build flexibility into the design of their production plants to be sure of a guaranteed future. This more or less forces them to use robotics systems.



1. An AdeptSight image processing system controls several Adept Quattro S650 robots handling solar cells. 2. Using SCARA robots in the photovoltaic industry makes sense when speed and extremely accurate positioning of wafers and cells are required. 3. Two Adept Quattro s650 robotics systems in a cell handling solar wafers

The fact that product commitment in the use of robotics lies purely in the software does have advantages. It means short response times for making changes and introducing new variants. The software for new variants can be thoroughly tested in the laboratory, well away from the production line. That usually means the production of new variants can start quickly and easily. Set-up times for product upgrades are eliminated anyway with software variants and plants are easily duplicated, since once the software has been created it can easily be copied to different production lines.

The triumphal march of robots in the solar industry is now unstoppable

If a company decides that it wants to use robotics across the board, it will need to set standards within the framework of a management decision. Some of the important questions that the robotics suppliers of the future will have to consider in their decisions are:

- Does the manufacturer have different types of kinematics (parallel kinematics, SCARA robots, 6-axis, linear axes) to meet all future requirements?
- Does the manufacturer offer effective support with programming its systems?
- Does the manufacturer also supply a powerful image processing system that has been developed for use with its robots and is this easily configured?
- How quickly can I get hold of spare parts?
- Does the manufacturer offer special training for programmers and operators?
- Is the documentation available in different languages?

Today around 35 per cent of all the robotics systems Adept supplies have integrated image processing and around 20 per cent of all robotics systems are supplied to the photovoltaic industry. Be it high-speed parallel kinematics, linear axis combinations, SCARA robots or elbow robots – all gain a high degree of flexibility with image processing. ▀

4. The AdeptSight image processing system is used not only for flexible guidance but also for monitoring the quality of the solar cells

Corporate Focus



Adept Technology GmbH markets the automated component handling and assembly robotics systems developed and produced by its North American parent company Adept Technology, Inc within Europe.

The product range includes high-speed parallel kinematics, SCARA robots, 6-axis vertical elbow robots, handling axes, image processing solutions for positioning and calibration, as well as flexible guidance solutions. These products are used by system integrators as the basis for complete guidance, assembly and handling solutions in manufacturing, assembly and packaging processes.

Typical sectors of application are the automotive supplier, electronics, consumer goods, and household appliance industries. Last year almost 20 per cent of all orders came from the photovoltaic industry.

For more information about ADEPT visit the website at www.adept.com and www.adept.de

One on One



Ruediger Winter, Director Sales Europe of Adept Technology GmbH discusses the opportunities for using industrial robots with integrated image processing in the photovoltaic industry.

“The triumphal march of robots in the solar industry is now unstoppable,” he said. “The important thing is to choose reliable partners and efficient products right from the start.”

“Production companies should definitely standardise since by standardising with one robotics manufacturer with a competitive product spectrum you can save enormously on cost.”

“ADEPT is the only manufacturer in the world that can offer linear axes, SCARA robots, six-axis and parallel robots with integrated drive amplifiers, plus its own image processing system developed in-house.”

