

Highly precise slicing machines made by Meyer+Burger AG from Steffisburg in Switzerland, thanks to Siemens technology

At the real cutting edge



Wire saws are indispensable for manufacturing solar cells

Wire saws made by Meyer+Burger from Steffisburg (CH) are indispensable for the manufacture of solar cell wafers and computer chips. Mainly used for cutting silicon, the saws can be used to slice wafers made of other semiconductor materials as well as of glass, quartz, sapphire and many other brittle materials. All the wire saws supplied by Meyer+Burger are based on controllers, drives and motors from Siemens.

Wire saws use a wire wound around several rolls to slice a block of silicon into several thousand thin wafers in one go with the help of a lapping suspension. The wire, which is only twice as thick as a human hair moves at speeds of up to 15 m/s. Every day, up to 1,000 km of wire run through such a machine. In order to keep within the very narrow geometric tolerances during a total slicing time that can sometimes exceed 12 hours, the open-loop and closed-loop control systems for

the machine must be the latest state of the art. Even the smallest irregularities during the slicing process have visible effects on the wafer quality and must therefore be avoided. For example, the wire must always be pre-tensioned with a constant force - no small achievement when the coils of wire and the rollers weigh considerably more than 100 kilograms. If closed-loop control were not performed so quickly and exactly, the filigree wire would immediately break given the speeds that are involved, and this would lead to an unscheduled shutdown of the machine.

Control concept based on Simatic technology

Meyer+Burger has decided to equip all its wire saws with Siemens products. A control concept based on the scaleable Simatic WinAC and Simatic Industrial PC is being applied. The PC-based control system was selected due to multi-task functionalities that are typical for a PC, such as visualization, communication and data processing but can also carry out the classical tasks associated with control systems and technological solutions.

The Simovert Masterdrives motion control system communicates with the controller via Profibus. The positioning controllers are connected with a fibre optic link (Simolink), so that the required synchronization can be realized. One of the drives works as a master and defines the remaining axes as slaves.

Apart from controlling the actual slicing process, the control system must have a suitable configuration enabling it to be connected individually to central customer-specific process control equipment. A worldwide remote diagnostic system for maintenance and updates via the Internet has also been implemented and makes it possible for service personnel in Steffisburg to react quickly to customer problems all over the world. This is an indispensable function, especially for support in the disproportionately growing markets in Asia.

Meyer+Burger is satisfied with the chosen solution from Siemens and plans to continue using the products on other tools. ■

Dr. Urs Schoenholzer,
Meyer+Burger Steffisburg
E-mail: u.schoenholzer@meyerburger.ch

