■ CRP Automationstechnik AG and Odevis AG, Germany

Double Separator

At Siltronic in Freiberg, two systems separate, clean, and dry 300-millimeter wafers and place them in coded batches for further production. All movements and actions are controlled by a Simatic S7-300 with T-CPU.

Pictures: Odevis AG

The manufacture of 300-millimeter wafers at Siltronic in Freiberg in eastern Germany requires that silicon ingots up to 400 millimeters in length be manufactured under clean-room conditions, sliced into wafers, and placed in cassettes in a water bath. For the subsequent intermediate step before the epitaxy, CRP Automationstechnik AG, based in Ampfing, Germany, and Odevis AG, of Burghausen, Germany, first developed one prototype plant followed by two production plants that separate the wafers (which stick to each other after slicing) and clean, dry, and store them in defined batches.

Single-controller solution

The entire separation process – several production steps, each of which requires precise positioning and motion control – is controlled by a Simatic 317T2 DP with a technology CPU. "We decided on the purely Simatic solution because the 317T2 DP already offers all the required functionality for this task, making additional functional modules or positioning controllers in the drives superfluous," explains Helmut Huber, automation engineer and program developer at Odevis. "A comparable solution, for instance via the drives, would have involved considerably more intense bus traffic and, almost certainly, longer cycle times for the entire process. Aside from this, the programming expense would also have been considerably greater."

All five axes of a separator are moved via Simodrive 611U drives, and the actuators and sensors are linked to the controller via distributed switch boxes with ET200 peripherals and Profibus. The control of the paternoster unit was implemented in the technology CPU, and magazine and data management were also transferred to the technology CPU. Overall, around 450 I/O signals are processed.

With the fast technology CPU, everything runs on one device, and the user-required overall lead time of 17 seconds from coarse cleaning trolley to batches was easily achieved. The hardware costs of the possible options (controller or drive-based) are roughly equal.

Distributed concept for operation and monitoring

A Simatic OP 170B operating panel has been installed on the clean-room side for the delivery of the coarse cleaning trolleys. On the other side, in the system itself, a Simatic Mobile Panel 170 is in use for setup and troubleshooting. The portable device can be operated at three terminal boxes and connected at any point in the plant using a 10-meter connection cable. The operator panels are connected via the combined DP/MPI interface of the technology-CPU.

In addition, a Simatic Panel PC 670 with Simatic WinCC has been installed on the front of the machine. Its main tasks are the handling and transfer of all product data to the downstream systems. The data use collected via transponder at the coarse cleaning trolleys, as well as the batches from beginning to end of the process, and transferred via the technology can be assigned to its batch at any time.

One controller for technology and motion control

The Simatic 317T2 DP integrates technology and motion control functions in the form of functional modules conforming to PLCopen. This enables technological tasks such as gear synchronism, cam profiles, movement to a positive stop, pressure mark corrections via measuring sensors, path- or time-dependent cam switching, and closed-loop positioning to be implemented without additional hardware and thus more cost-effectively. The functional modules are certified in accordance with PLCopen and are called from the user program. In addition to the usual standard FUP (Function Plan), KOP (Contact Plan), and AWL (Instruction Set) languages, engineering tools such as SCL, S7Graph, or CFC can also be used for programming. The uniform architecture simplifies both engineering and project management.

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Helmut Huber, automation engineer and program developer at Odevis

The ability to program the solution universally in Step 7 offers several advantages, explains Huber: "The programming is familiar, there is no need to learn any special motion control language, and the new and, in my opinion, excellent functional modules can be used immediately. Working with virtual axes simplifies the introduction because it is also possible to work without drives connected."

Odevis AG, an international systems vendor for industrial applications in the fields of automation and IT, primarily uses automation technology from Siemens, as the comprehensive product range facilitates universal solutions tailored to each other. Design engineer Walter Kokott from CRP values the 3-D data models made available by the manufacturer because it is possible to determine, at the push of a button, whether or not a component will fit in a particular location. "CRP plans, designs, and manufactures complex specialist machinery for users in a wide range of industries as well as products for aviation and aerospace. We welcome anything that gives us a head start," says Kokott. ■

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