

Unaxis controls DVD coating machine with Simatic S7-300

# High-tech made in Switzerland

Today, it is virtually impossible to imagine a life without CDs and DVDs as music, video or data media. It is common knowledge that the shiny disks come primarily from Asia. The machines in which they are manufactured come from Balzers, Liechtenstein. The Data Storage Solutions division of Unaxis builds highly-productive DVD coating machines using automation technology from Siemens.



**DVD Sprinter 8/8 from above: a look at the star-shaped transport unit which passes the disk from vacuum chamber to vacuum chamber**

To understand the coating process, it helps to take a brief look at how a rewritable CD or DVD works. The read/write laser is guided in a groove already present on the polycarbonate medium. Apart from various basic and protective coatings, it is an embedded coating consisting of a tellurium/germanium/antimony alloy which is used to store data that is of primary importance.

## Vacuum technology as core competence

It is the task of the DVD "Sprinter" coating system to apply the various coatings with the required properties to the medium. This is done by passing the polycarbonate disk through a circuit of eight coating stations. "The coatings take place in high vacuum. The biggest challenge is controlling this vacuum", says Gerhard Kessler, systems engineer at Unaxis. "But vacuum technology is a core competence at Unaxis, and indeed, that is the reason we developed the DVD Sprinter." The company, however, also developed a good deal of its own know-how about the coating process itself: "The objective of the process must be to coat the disk as quickly, and above all, as uniformly as possible", explains Stefan Marxer, product manager and head of the rewritable optical disk division at Unaxis.

## Shorter cycle times

Because the coating process generates heat, the disks have to be cooled. The high-efficiency cooling system, however, places extremely high demands on the control

system's sampling interval, and thus on the controller's cycle time. "As far as cycle time is concerned, our old control system was always a bit overtaxed", comments Walter Sulser, electric design engineer at Unaxis. "That is why the decisive criterion for a new solution was the speed of the PLC. The fact that we wanted the DVD Sprinter to be modularly expandable and flexible also spoke for a solution from Siemens based on Totally Integrated Automation and a distributed solution approach", says the control system expert. The S7-300 was the logical choice because it was small and, equipped with a CPU 317-2 PN/DP, very fast, and because it came with two integrated interfaces. "When the design is so compact, the independent wiring of the modules is a big advantage", continues Sulser. Both non-time-critical components, such as the valves for the high vacuum, and the highly time-critical core processes for coating are controlled over the integrated Profibus DP interface. The link to the higher-level Industrial PC is established over the Profinet Ethernet interface.

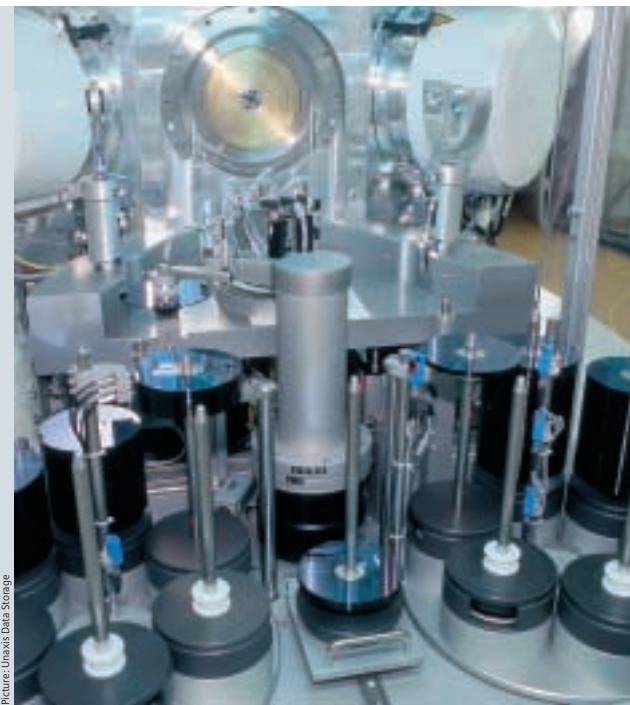
#### Decentralized structure for modularity

Because not all components would have fit physically into the control cabinets the people at Unaxis also decided to install several distributed Simatic ET 200S I/O racks right in the coating machine. These Simatic ET 200S I/O racks are equipped not only with

## About Unaxis Data Storage Solutions

Data Storage Solutions is the world's leading manufacturer of total replication and coating solutions for optical data storage media like CDs and DVDs, and magnetic data storage like hard disks. From leading-edge coating to cost-effective integrated production lines, Data Storage Solutions supplies high-quality and reliable solutions for all formats. More than a third of all hard disks, two-thirds of CDs and CD-ROMs and over 80 percent of rewritable CDs, DVDs and minidisks are made worldwide on Unaxis systems.

**More information about Unaxis Data Storage Solutions:**  
[www.datastorage.unaxis.com](http://www.datastorage.unaxis.com)



Loading and unloading the DVD Sprinter 8/8 with polycarbonate substrates and coated disks

inputs and outputs, but also with Siemens counter modules for measuring the flow rate of the cooling water. When there is a shortfall in the flow rate and the cooling capacity can no longer be guaranteed, an alarm is triggered.

#### Success in Asia

The company enjoys a market share of 90% with the production of DVD Sprinters, 80% to 90% of them are exported to Asia. The "European" control solution is not an obstacle: "In Asia, companies place a lot of value on prestige. They are proud to have the very best technology", explains systems engineer Kessler. "We have now had several years of experience with the S7-300 on the DVD Sprinter. During this time we had not one controller failure, and we have never heard any complaints from our customers. A successor machine is currently in the planning phase, and Siemens will again most certainly be short-listed."



## Vacuum technology

Not only sophisticated high-tech products but also many everyday items depend on vacuum technology for their manufacture. Thin film deposition in particular is possible only in a vacuum to ensure that the coating material is uniformly distributed. A vacuum is used in microchip manufacture and for coating flat panel displays and storage media like CDs and DVDs. Many analytical instruments like electron microscopes and mass spectrometers depend on vacuum technology for their operation. Likewise, coolant can only be filled into refrigerators and brake fluid can only be inserted into automotive braking systems once the air has been extracted.

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