

## Modular machines are a must Fieldbus technology is the basis of decentralised automation

The trend to use remote I/O components at the machine and in the installation remains unbroken. Consequently, the performance profile and capability of the remote I/O level have become key factors, whether in systems based on programmable logic controllers or PC control. The high demands placed on the I/O system are fulfilled by the I/O concept presented in this article.

The company Unaxis Data Storage, a division of the Unaxis AG, is a leading supplier of manufacturing solutions for optical storage media, such as the CD and DVD and the hard disk. A wide spectrum of solutions is manufactured, ranging from advanced metallizing and mastering systems to complete production lines. The company is the global market leader, since two-thirds of all CS and more than 80% of all CD/RW, DVD and mini disks are produced at the company's sites. Additionally, Unaxis is world-wide the only supplier of solutions for all data formats.

### Modular production systems

In a modern production system for DVD9, the manufacturer successfully applies the I/O system piconet®. DVD9 is a format with a storage capacity of 8.5 GB. The two disc layers are equipped with an information layer each, one of which is semi-reflective so that the laser scanner can read both layers from one side only. This format can be extended to up to 17 GB (DVD18) with a total of 4 layers which be scanned from both sides via one laser scanner each.

The production of semi-reflecting layers is extremely demanding. In order to ensure economical production, the system must be highly precise and stable and the repeat accuracy of the process must be excellent. Unaxis masters these proceedings and produces complete production lines, such as the MATRIX system for the DVD 9 format (fig. 1), as explained in this article.

The „Matrix“ is a complete production system for DVD9 formats. The system is equipped with two metallizers with a 2.5 s cycle time. The discs are coated in a complex procedure, formatted and bonded precisely. It goes without saying that maximum precision and stability is required in all production stages to ensure high system productivity.

The modular construction of the production system is based on precise manufacture and complete testing of individual machine sections. Thus the smooth and cost-efficient production of the system is guaranteed.

### The fieldbus technology

The cabling system piconet® ideally supports the modular system construction (fig. 2). In each system section there are several system modules, which record the sensor signals and transfer these to a master station via an internal bus system. The master station – and thus the individual sub-sections of the system – are connected via a standard fieldbus to the central control. The control system sends the control commands to the master station, which - in turn – controls the actuators via the piconet® modules. Since the module electronics are fully encapsulated and provide IP67 protection rating, these can be mounted directly at the machine base without any additional precautionary measures.

### All modules and the cabling feature protection degree IP67.

The fieldbus modules of the piconet® family are small and compact. With a size of 175 x 30 x 27 mm, or even only 126 x 30 x 27 mm, they can be mounted directly at the machine level. This construction not only offers distinct advantages for the construction of machines and systems, but also provides the possibility of applying fieldbus technology under difficult mounting conditions. In addition to the stand-alone modules, which are generally equipped with eight digital inputs and outputs, the system also comprises coupling and extension modules, which are interconnected via a plastic fibre-optic cabling system called „IP-Link“. The coupling modules are connected directly to the higher level fieldbus such as PROFIBUS-DP, DeviceNet™ or CANopen. Per coupling module, up to 120 remote extension modules can be interconnected via the IP Link. The distance between the individual modules may be up to 15 m. The piconet® system is not only a cost-effective „wiring“ alternative, but also offers the highest level of data integrity due to the fibre optic network. A new addition to the family is the coupling module with dual bus connector, eliminating the need for external T or Y pieces for connection to the respective fieldbus. Despite its extended functionality, the new coupler features compact dimensions of only 210 x 30 x 27 mm. Owing to the IP67 housing, all modules can also be used in harsh industrial environments exposed to dust, oil or humidity. Even shock and vibration pose no problems for the fully encapsulated modules.



**The customer benefit**

Due to pre-assembled cabling products, the system is plug-and-play compatible and ensures error-free and cost-efficient production of individual machine and system components. The modular system sections can be pre-tested without a connection to the central control. Further, it is also possible to save valuable space in mounting cabinets. The manufacturing process can be controlled more efficiently, a fact that is reflected in shorter cycle times, lower error rates and, ultimately, in more reliable delivery planning.

Based on shorter time-to-market cycles and the higher productivity, a significant optimisation of the production costs is achieved. Maintenance and service are also facilitated for the end customer: The applied industrial cabling technology ensures long-term stable system function, even under adverse environmental conditions, and simple interchangeability of all products.