Siemens SIMOTION was the right choice for the development of a pharmaceutical packaging machine to fulfill the ambitious objectives of cost reduction, standardization with resource-saving material consumption and the efficient use of energy.

Curti Costruzioni Meccaniche was founded in 1957 in Imola, Italy with the goal of building machines and equipment for the textile and agricultural industries. Over the years, the company specialized in the aviation industry as well as in the development and manufacturing of packaging machines for foodstuffs, cosmetics and pharmaceuticals. The business segment, Curti Packaging, developed the new cartoning machines AVM 100 and AVM 150 for the packaging of vials and ampoules for the pharmaceutical industry. The AVM is a synonym for one of the most innovative packaging developments in state-of-the-art technology. The main objectives of the new construction were the reduction in packaging costs, the standardization of package sizes in relation to the container to be packaged and, ultimately, the sustainable and resource-saving operation of the machine.

Additionally, of course, the simple operation and maintenance of the machine was also important. Curti’s engineering department broke away from the classical approach to machinery construction and implemented only automation components of the latest generation that meet these high standards without compromise. The AVM consists of a carousel with 12 stations that run through the vials or ampoules during packaging. In the first workstep, the vials are gently guided from below into the boxes. In the steps that follow, the glue is applied, the box is closed and the customer-specific functions are carried out. Thus, for example, a quality seal can be applied or a resealable packaging produced. The AVM can process boxes ranging from sizes 60 x 40 x 35 up to 90 x 190 x 80.

For this innovative machine concept, Curti selected the Siemens company as its comprehensive supplier for automation technology. Because of the strategic significance of the AVM Ecogenius and the complexity of the requirements, Curti’s engineering department found itself confronted with a variety of technological and logistical problems.
The AVM is, in fact, a fully electronic cartoning machine; an asynchronous motor rotates the carousel, the individual workstations are synchronized with the main drive by means of servodrives. The SINAMICS S120 drive system and the SIMOTICS S-1FK7 motors from Siemens were found to be the ideal solution, not just to be able to perform highly dynamic movements alone.

Using a single double-axis module, different drive systems can be driven with synchronous or asynchronous motors (control types: U/f, vector with/without feedback, servodrive) with simultaneous type reduction. For this new machine, Curti selected the latest automation concept available on the market, able to accommodate both current and future developments. The SINAMICS S120 drive package is part of the great family of drive systems from Siemens, which offers both variable-speed drive technol-
ogy as well as high-end motion control. SINAMICS covers a range from 120 watts to several megawatts. The master SIMOTION controls can, in particular, also operate the articulated-arm robot used by Curti, with no additional robot controls being required.

Today, Tecno IMI presents itself as a group that supports customers by providing a complete package of services and global solutions in the area of technical plant construction. They always have the objective of being the strategic partner for large company groups and the tertiary sector.

For industrial automation, the company supplies everything from the electric components up to complete conveyor systems, when required also with robot systems. The complete configuration comprises 8 servo axes; an induction motor as main drive and 4 additional induction motor drives for auxiliary power units that are controlled from a SIMOTION D445.

The controller coordinates all SINAMICS S120 drives and also covers, in addition to the motion functionality with the internal technology functions, the temperature control and the PLC functionality. The SIMOTION system is scalable and therefore easily adaptable to various requirements. There is both a drive-based version, a controller version and a PC-based variant. The selection of the appropriate control system is based upon the required functions, such as temperature control, number of axes, safety, etc. A master MP370 touch panel is connected via PROFIBUS with the SIMOTION controls and is used for prescription management and machine operation. The SIMOTION can communicate with the outside world via PROFINET, Standard Ethernet and CAN bus systems. Thus, the end user has no restrictions on the choice of his preferred field bus system.

The connection of the individual motors via DRIVE-CLiQ simplifies commissioning and service considerably; motor parameters are automatically transferred to the controls by means of an electronic nameplate and safety features are available. Thus, when servicing becomes necessary, the end users can freely replace defective motors themselves. By comparing the stored data with the electronic nameplate of the motor it is thereby ensured that only those motors can be implemented that are recognized by the controls.

The AVM is basically equipped with barcode readers in order to ensure the traceability of the product, which

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**Highlights**

- One control system for the entire function of the machine: motion, PLC and technology functions such as e.g. temperature
- Predefined function blocks for “simple” motion control
- Various field bus systems: PROFIBUS, PROFINET, Ethernet and CAN
- Motors with electronic nameplate
- A drive system for both synchronous and asynchronous motors
- Investment security by means of a scalable automation platform of the latest generation
- Integrated “Track & Trace”
is a requirement in the pharmaceutical branch (Track & Trace). It can also optionally communicate with higher IT systems to allow production data to be collected.

For the programming, the electrical department of Curti uses both structured text (ST), function blocks for motion (MCC), as well as the classical function (CSF) and contact plans (COP). The SIMOTION Scout development environment is, in fact, one of the most powerful software tools on the market, allowing the programmer to use different programming languages for different purposes.

Thus, the machine logic can be easily created with LAD/FBD, the coordination of the axes implemented flexibly with ST and, using predefined motion function blocks in MCC, the creation of complex, coordinated movements also presents no difficulty.

Only a few characteristics of this new AVM machine series have been presented here. Naturally, all of the various standards of the pharmaceutical industry must be met with a focus, at the same time, on energy and resource-saving operations. The AVM cartoning machine is optimally prepared to do this and sets new standards in the packaging of ampoules and vials.