“Simply good coffee” – at the press of a button – is the success concept behind the coffee pod machines, which have been establishing themselves in households for a good 10 years now. Each of these coffee pods, also known as soft pod, is a small individual package of coffee powder that is manufactured and packaged in several steps. Optima is one of the leading manufacturers for these types of packages. In the packaging sector of Optima consumer, 250 packaging specialists develop and produce machine solutions for numerous leading companies active in the areas of nutrition, chemicals and cosmetics.

With the new packaging system for portion and combination packages, the development teams in Schwäbisch-Hall, Germany have developed a machine line that not only takes into account all of these requirements, but also has a highly flexible and modular design to further reduce construction and commissioning costs. The dosing and filling unit can be simply equipped with the appropriate modules, and thanks to intelligent pick & place technology, can package the widest range of product shapes, forms and sizes in the appropriate final packaging.

A new packing system for coffee pods fulfills several customer requirements in one go: The machine has a performance approximately 25% higher than previous systems, does not require an external cabinet – and is also simple to operate and maintain.
Completely integrated drive technology

The latest CFL4-10d machine for packaging soft pods is at the upper end of the performance spectrum: The ten track dosing unit in a double index design fills 20 coffee pods in just one step. The machine has an integrated 2-track tubular bagging unit, in which the soft pods are packaged in a nitrogen atmosphere ready for sale. With a footprint of about 4.3 m × 1.2 m, the new system turns out 1500 pods per minute. In many ways, with this new machine, Optima is entering new territory, confirmed by the development team. To start, the system dosing unit has been completely changed over to servo technology. When compared to previous models, this made it possible to significantly boost the performance by 25%.

Further, for the automation and drive technology, the manufacturer used an integrated and especially compact solution from Siemens. This means that the complete electrical system can be accommodated in and on the machine. The 52 servo axes of the machine are controlled by three SIMOTION C240 controllers for the sub-areas of dosing, filling and packaging – as well as one SIMOTION D435 controller for the tubular bagging unit. In the tubular bagging and dosing sections, Optima uses SINAMICS drives with a high dynamic performance. The weighing station for quality monitoring is equipped with a SIMOTION D410 controller. The system functions can be monitored and operated using a SIMATIC HMI IPC 477C industrial PC for the tubular bagging section and a SIMATIC MP377 touch panel for the dosing section.

Performance in the tightest space

For the first time, Optima employed a complete SIMOTION solution with this level of complexity for these machines. The actual highlight of the system is in the section where the soft pods are filled, sealed and weighed: in integrated control cabinets about 50 cm high located below the machine. In addition to the controllers, the compact SINAMICS S120 booksize converters are also installed, which control the motors. This high packing density continues in the process itself. The twenty SIMOTICS S-1FK7 motors to control the dosing screw conveyors and the die are installed together in an extremely restricted space in the compact and withdrawable dosing unit. Five motors are connected to the converter below the machine using a cable via Drive-Clq and hub modules; this represents another special feature of this solution as confirmed by the development team. As a consequence, only four instead of twenty cables have to be routed through the cable tow and installed in the frame construction. This significantly reduces the cost and space required for the cabling. And fewer cables means less work for the maintenance crew. When engineering the machine, Optima employed a multi-controller solution, where each controller is an assigned a functional unit within the overall system. This means that with the new system, every programmer works at one function section with its own dedicated controller. This is an approach that corresponds to a modular machine design as well as the thought process and structure of the machine manufacturer. And of course, the development team is convinced that the new system will be successful in the market: “With this system, we address the requirements for compact machines ready to be switched on – without an external control cabinet and without wiring. Drive technology plays an important role in achieving this objective.”

With the CFL4-10d packaging system, the development team implemented a machine that is ready to switch-on without an external control cabinet and without wiring.

The 20 Simotics S-1FK7 servomotors for controlling the dosing screws and tampers are installed side-by-side in the withdrawable dosing unit in an extremely small space.