

New bag filling and closing machine from Fawema:

Servo Technology Is Key to More Cost-Effective Machine Building



This year's interpack saw the introduction of the Fawema FA 217, a brand-new bag filling and closing machine for pre-made bags. The new machine, which is equipped with automation technology from Schneider Electric, demonstrates that modern servo drive solutions can do more than just increase flexibility. With the FA 217, the company was also able to reduce manufacturing and operational costs at the same time.

When it comes to innovative bag filling and packaging machinery, Fawema is the company to turn to. This entrepreneurial machine builder, with approximately 100 employees has been in business for over 90 years. Fawema used interpack 2011 as the platform for introducing the FA 217, a brand-new bag filling and closing machine for packaging dry powders and granulates such as flour, sugar and tea. The FA 217 can be combined with net weighers, auger fillers or cup fillers and can handle quantities ranging from 0.5 to 5 kg (or up to 7.3 liters) in pre-made paper block bottom bags, coated block bottom bags or side gusset bags. It can process up to 80 bags per minute, regardless of package size. Fawema received financial assistance from the Federal Ministry of Economics and Technology to develop the new machine as part of a program approved by the German Bundestag.

Independent single drives for increased flexibility

The FA 217 takes the functional principle of the line shaft drive, a technology that has been tested and proven in older machines for more than two decades and transfers it to modern servo technology. Thomas Krimmel, Electri-

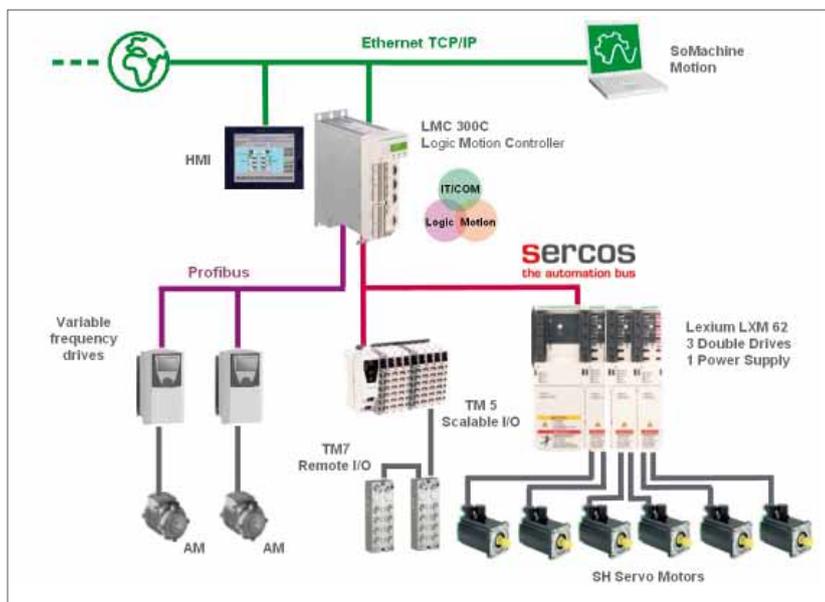
cal Department manager at Fawema, explains the various reasons for this approach: "One aspect was of course the greater flexibility this gave the machine. Compared with its predecessor, the FA 217 can work with a larger range of weights. The drive design with single drives also allows the ratio of filling time to transport time to be adjusted if necessary. For example, we can increase the filling time for sensitive products such as tea and then, to compensate for this, we can reduce the bag transport time as needed."

The FA 217 is a compact machine with a chamber transport system. It can fill and close two bags (e.g. 1 kg) at a

"The new FA 217 generation of machines is an important step for us and will allow us to continue offering our customers high-quality packaging machines designed using the latest technology."

Peter Steindl, Managing Director and owner of Fawema/Engelskirchen





Architecture of the PacDrive 3 automation solution: In addition to sercos III as the drive bus, Profibus was installed to connect the I/O level, the variable frequency drives, and motor starters

time or only one bag in the case of larger filling weights, such as 5 kg. Two parallel magazines for the pre-made bags are located in front of the filling station and bags are fed from these magazines simultaneously. The transport system spreads the bags open and guides them to the filling station where the filler is located. The filler, which is equipped with its own servo drives, can be adapted with a height setting to accommodate different package sizes. Krimmel points out that "because of the height-adjustable filler, we no longer need to have a height-adjustable conveyor belt. This reduces the amount of mechanical effort needed and above all decreases space requirements, which allowed us to significantly reduce the size of the machine housing compared with the predecessor system."

After a bag has been filled, and as it is being transported through the system, it is subjected to much more effective product vibration than was possible in the predecessor machine, thus achieving better compaction of the contents. The bag opening is then pre-folded, closed and sealed. The machine can perform flat-top, flat-fold or vertical closures.

The automation solution in the FA 217 is based upon PacDrive 3, the latest generation of Schneider Electric's proven control technology. The servo drive solution uses the single and double drives of the Lexium LXM 62 multi-axis solution, powered by a shared power supply, two single drives and one double drive for the basic machine, and additional drives depending upon the selected variant. The fixed-speed AC motors, which can also vary in number, are

controlled by the TeSys U motor starter. The motor starters, which are connected with the central PacDrive Logic Motion Controller LMC 300 via Profibus, also enhance the available options for power monitoring and diagnostics. The variable frequency drives for the two speed-controlled AC motors are also coupled with the PacDrive controller via Profibus. The PacDrive controller communicates with the drives and with the I/O level via sercos III, the Ethernet-based automation bus in PacDrive 3. The Magelis XBT GT control panel is connected with the controller via Ethernet TCP/IP. The machine program is based upon the PacDrive template. With its consistent use of modular software

structures and standardized programming, this template allows greater reusability of portions of the machine program in other equipment or in successor machines.

Server technology to reduce the cost of production

By switching over to server technology, Fawema is not only pursuing its goal of greater flexibility but is also clearly aiming to reduce its manufacturing and operational costs. By eliminating the line shaft and cam discs, for example, it was able to reduce the number of parts required and thus considerably simplify the machine design. "We also made sure that the automation solution and the electrical components fully exploited every opportunity for reducing installation times," reports Krimmel, adding that "after a thorough comparison of costs for the relevant automation solutions currently on the market, we decided to use the PacDrive technology from Schneider Electric. Key factors in the decision included not only hardware costs but also aspects such as space requirements in the control cabinet and installation costs."

The multi-axis servo drives of the Lexium LXM 62 series servo solution in particular contribute significantly to cost savings. The ability to power drives from a shared power supply is not only more efficient for multiple axes than using drives with individual power supplies, it also reduces installation costs: In a serial configuration, no backplane connections are required for connection to the power source and the ground wire or to integrate the unit into the DC bus. The modules are connected with the power supply and with one another using front-side quick-connect slides with integrated stop screws for solid contact. Pluggable cables on the motors that can be attached from below make the connections to the power supply, motor brake, and thermoelement.



Two bags are filled and closed in parallel (picture shows the multi-stage folding and closing process)

Parameterization of the servomotors and drives is largely automatic, based upon electronic name plates. Upon the first use or change-out of a device, both motors and drives are identified by the central controller and are then configured based upon the specified parameters. Because sercos III offers Ethernet-based communication, there is also no need for hardware to set bus addresses.

Thomas Krimmel sees even greater future potential for savings in ILM servo modules. These servomotors with integrated control technology are currently being readied for market introduction by Schneider Electric. ILM servo modules use a flexible approach to networking that incorporates pre-terminated hybrid cables and distribution boxes and they further reduce the already low space requirements in the control cabinet permitted by the LXM 62 servo drives. The same power supplies can be used for both ILM servo modules and LXM 62 servo drives. This allows the two drive series to be combined in mixed configurations as well. Krimmel summarizes the prospects for this technology by pointing out that "we can use the ILM series like the PacDrive modular programming concept to further refine our design concepts for independent mechatronic machine modules. This will also significantly lower the costs of producing different versions of our equipment designs."



The PacDrive 3 automation solution: The new LMC-series controller is on the left, next to it on the right is the shared power supply with LXM 62 servo drives arranged upon it; above this, a row of TeSys U motor starters

Lower changeover and maintenance costs

Krimmel emphasizes that machine operators will also benefit from this servo-based machine design. "Not only were we able to position the FA 217 in an attractive price segment, the servo technology also reduces the number of format-specific parts. A complete set of parts costs only 30 % of what it cost for the predecessor machine." Retooling times are also reduced accordingly, as Krimmel confirms: "With a little motivation, operators can achieve retooling times in the range of 30 minutes instead of the previous 90 minutes."

Servo technology in general and PacDrive 3 in particular also helps to reduce maintenance expenditures. For example, the elimination of mechanical cam discs and their need for lubricating oil lengthens maintenance intervals. The absence of mechanical drive shafts also improves accessibility to individual functional units. Together with the use of electronic name plates to automate commissioning of parts, the pluggable connections used in PacDrive technology can shorten downtimes when changing out parts. ■

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