



The Metis™ continuous motion machine is one of the latest technological developments from Matrix Packaging.

Matrix Packaging: PC Control, EtherCAT and AM8000 servo motors with One Cable Technology save cabinet space and reduce costs

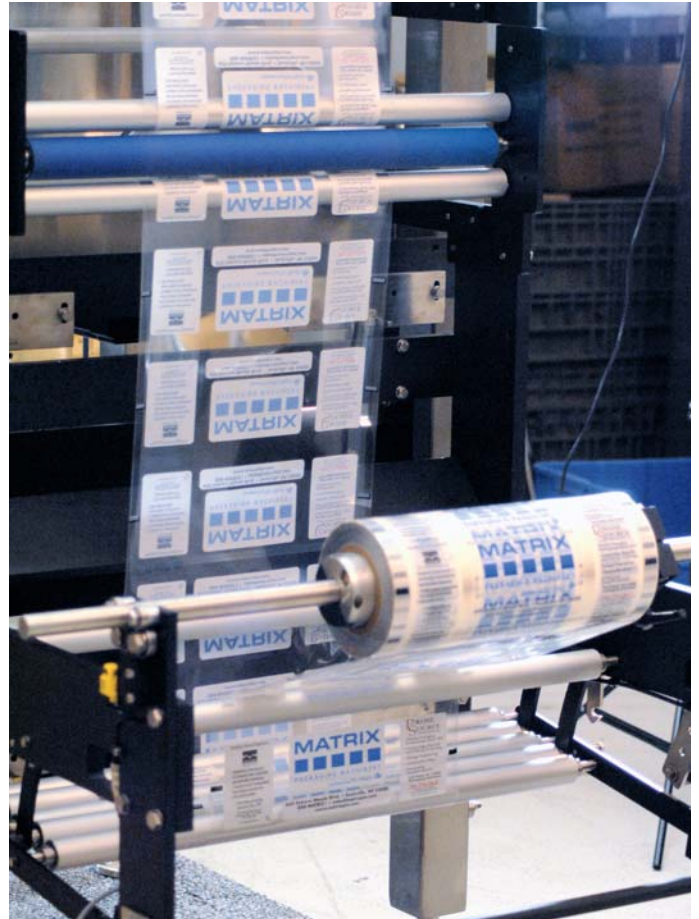
Vertical form-fill-seal machine: PC-based control technology provides compelling advantages

Matrix Packaging, based in Saukville, Wisconsin has over 20 years of experience in developing vertical form-fill-seal machines. The company's new Metis™ model, which was unveiled at Pack Expo 2013 in Las Vegas, sets new milestones in efficiency and performance. With its PC-based control technology, the machine can flexibly fill between 1 and 180 bags per minute, depending on the product and the packaging line.

"The new Matrix Metis represents a new generation of vertical form, fill and seal (VFFS) machines," says Marc Willden, Vice President & General Manager of Matrix Packaging Machinery. "The Metis was designed for the diverse needs of the food industry, in which we have a strong position, and is ideal for packaging cheese, coffee, snacks, candy, etc." Matrix customers also include companies that package items such as hardware for home improvement stores.

"What makes the Metis so special is the fact that it operates with continuous motion, which significantly increases its capacity and throughput. On the other

hand, it also requires a much higher degree of automation," explains Willden. Because the bag film moves continuously, the mechanical jaws that seal the bags operate on the fly as well, synchronized via EtherCAT. The Metis is particularly well suited for the processing of small and thin bag films at high speed. Depending on the line, the machine is able to process between 1 and 180 bags per minute. This level of flexibility ensures the best possible product flow and higher quality packaging.



Depending on the line, the vertical form-fill-seal machine can process between 1 and 180 bags per minute.

Standardization based on PackML enables easier engineering and creates transparency

The control system architecture consists of a CX5020 Embedded PC, an integrated 15-inch CP2915 multi-touch Control Panel, EtherCAT I/O terminals, AX5000 EtherCAT servo drives and AM8000 servo motors with One Cable Technology, as well as TwinCAT NC.

The result is a state-of-the-art machine on the basis of the OMAC PackML standard. "Since October 2011 Matrix Packaging has been part of the Pro Mach group, which has over 20 brands dedicated to packaging technology. Pro Mach is a big believer in the PackML standard. With features like standardized operating mode management and communication structures, PackML provides immediate clarity. It also reduces the engineering and integration costs, increases productivity, and provides improved diagnostics. All these benefits deliver real added value to our customers," says Marc Willden.

Modern multi-touch HMI concept

"We decided to use multi-touch technology because of the bright, high quality displays that are available from Beckhoff," says Mike Krummy, who is in charge of electrical engineering at Matrix Packaging. He adds: "PackML requires a fairly large user interface, and implementing this on a traditional 6-inch screen would have been difficult. The Metis is now equipped with a 15-inch diagonal

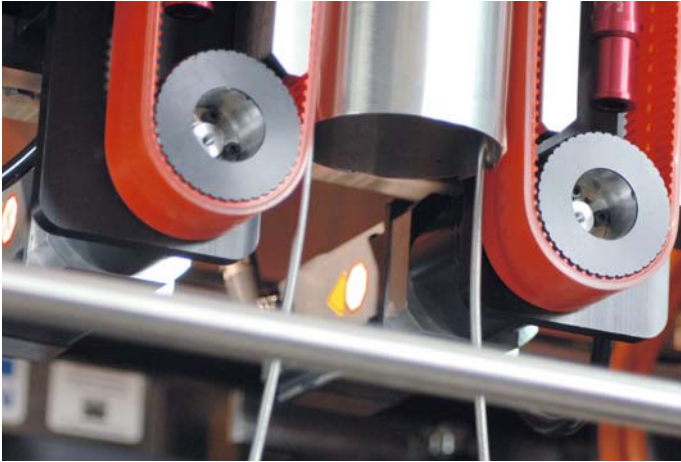
multi-touch screen, the CP2915, at nearly the same cost as our previous panels, which were much less elegant with their single-touch interface and conventional plastic housing." The Matrix Packaging team is highly impressed by the multi-touch functionalities such as the enhanced ability to scroll and use two hands. "If an operator has accidentally removed the protective barriers on the machine, his hands are always in a safe position, even when the machine is running," as Krummy points out.

Integrated platform for PLC, motion control and visualization

The compact, DIN rail-mountable CX5020 Embedded PC serves as the integrated platform for PLC, motion control and visualization. It controls all the programs that facilitate the communication with downstream components on the line, synchronize the feeder with the Metis machine processes, trigger the mechanical bag sealing jaws, etc. It also controls the two AX5000 EtherCAT servo drives that handle three axes of motion. Matrix Packaging only needed two servo drives to run three motion axes by utilizing a 2-channel AX5000 drive and a 1-channel AX5000 drive. The motion profile is implemented via the NC camming function, which is part of TwinCAT.

OCT reduces cabling

"By selecting servo motors from the AM8000 series with One Cable Technology (OCT), we streamlined the motion control even more. OCT is efficient and fits into our machine concept," explains Mike Krummy. "Through the use of One



By leveraging One Cable Technology from Beckhoff, Matrix Packaging was able to reduce its motor cabling by 50 percent.



The high-quality 15-inch Control Panel with modern multi-touch technology is another highlight of the Metis™.



One CX5020 Embedded PC controls the entire machine, including motion control and visualization. The motion system has been implemented using AX5000 EtherCAT servo drives and AM8000 servo motors with One Cable Technology.

Cable Technology and the elimination of several smaller parts, our cabling effort has been reduced by 50 percent."

EtherCAT delivers unlimited expandability and interoperability

In addition to the high performance of EtherCAT as an I/O and motion control bus system, Matrix Packaging appreciates the system's expandability and interoperability as well as the wide range of EtherCAT I/O terminals for special functions. One of these is the EL3681 digital multimeter terminal for cost-effective power supply monitoring. "For example, if an operator runs the VFFS machine with insufficient voltage, an alarm monitor triggers an emergency stop and reports that there is a problem with the power supply," explains Mike Krummy. "Compared with a separate stand-alone solution, the integrated terminal is a much more cost-effective option."

Any concerns that the machine controller and fieldbus won't be able to keep up with the inventiveness and development potential of Matrix Packaging are now a thing of the past. "It's quite impressive that our Metis machine uses less than 1 percent of the new control platform's capacity," adds Marc Willden. "The PC-based controller and EtherCAT have plenty of reserves for all future requirements."

New platform saves space and money

Reducing the footprint of machines is another major goal of Matrix Packaging that was achieved by using the Beckhoff control platform. Taking advantage of the compact design of the control components, the electrical cabinet of the Metis is roughly 6 inches (15 cm) shorter than that of the prototype, which was equipped with a traditional PLC. "Control cabinet assembly takes much less time now, not just because of the One Cable Technology of the motors, but also because of the intelligent design of the EtherCAT Terminals. EtherCAT has reduced our control cabinet wiring costs by 30 to 40 percent," says Mike Krummy.

"Although the Metis delivers much more performance and functionality, the PC-based controller costs us approximately 10 percent less than the originally planned PLC solution – even with the addition of the multi-touch user interface," says Marc Willden. "The Beckhoff approach to automation with its focus on accepted standards is similar to the philosophy of Matrix Packaging. We avoid using any proprietary mechanical or electrical components, as we prefer standard products and technologies that are proven in the industry." Accordingly, Matrix Packaging is thinking about migrating additional machine lines to the PC Control platform from Beckhoff.

Further Information:

www.matrixpm.com

www.beckhoffautomation.com