

Drive & Control profile

Rexroth integrated motor/drive control system helps streamline new generation of servo-driven case packers



The BrentonPro Series Mach-2 uses a Rexroth integrated motor/drive and motion logic control platform to improve machine performance, save space, lower costs and save energy.

Brenton Engineering designed a new line of side-loading case packers to exceed current “green manufacturing” end user trends, featuring servo control to increase speed and reduce energy costs within a compact footprint

Brenton Engineering (www.brentonengineering.com), a large provider of packaging and palletizing equipment located in Alexandria, MN, spent months consulting with customers and

vendors before designing the next generation of its popular BrentonPro Series of case packer machines.

“We asked our customers how we could improve the machine. The

Challenge:

Design a new line of side-loading case packers to increase speed, lower machine costs, save energy and reduce space

Rexroth Solution:

- IndraDrive Mi integrated servo motor/drive platform with built-in I/O
- IndraMotion MLC L40 motion logic controller with SERCOS communication and Flex Profile functionality
- Windows CE-based IndraControl VEP40 HMI

Benefits:

- Eliminated 200+ moving parts
- Reduced overall machine footprint
- Reduced costs by one third
- Reduced cabling by 80 percent
- Energy savings of up to 25 percent
- Reduced waste
- Reduced control cabinet space by 25 percent
- Distributed I/O cuts costs
- Flex Profile optimizes performance
- Modular machine design allows functionality additions without significant changes to the control cabinet

feedback was to make it a faster and simpler all-servo machine,” said Mike Grinager, VP of Technology for Brenton Engineering. “With the new design we did everything we could to reduce the complexity of the machine. We took out the pneumatics, which was the most expensive aspect of the machine, and our engineers removed more than 200 moving parts, reducing costs by one third. Plus, the integrated servo motors and drives that we now use require less space than even the smallest motors we used previously,” said Grinager.

As a result, Brenton’s new [BrentonPro Mach-2 case packer](#) is an all-servo-driven, side-load case packer featuring an [IndraDrive Mi integrated motor/drive](#) platform with SERCOS distributed I/O, an [IndraMotion MLC motion logic controller](#) and the [IndraControl VEP40 human machine interface](#) (HMI) all from Bosch Rexroth (Hoffman Estates, IL www.boschrexroth-us.com).

According to Grinager, the multi-axis machine reaches speeds of up to 25 cases per minute and can accommodate a variety of cases, including RSC, HSC, tray, wrap-around, knock-down and harness for cartons, bottles, cans and tubs. During operation, an empty case blank is picked by vacuum and set in the machine. The case is moved through loading and sealing sections of the machine, which are powered by servo-driven flap traps. After loading, the full case is indexed through a compression and sealing area. The completed case is then discharged on the customer’s takeaway conveyor.

Brenton developed the Mach-2 case packer to minimize the environmental impact of packaging operations



Rexroth’s integrated motor/drive system helped Brenton Engineering cut out more than 200 moving parts, reducing component costs by a third.

through the appropriate use of electric servo drives, resulting in lower energy consumption—including zero air consumption—and less product and packaging waste. The company worked closely with local Bosch Rexroth distributor Motion Tech Automation (Oakdale, MN www.motiontech.com) during this phase of the development.

“We recommended Rexroth’s compact, scalable IndraDrive Mi integrated motor/drive system, which is an innovative, cost-effective and simple solution that satisfies the design challenges for today’s modular and high-performance packaging equipment,” said Shawn Nelson, sales engineer at Motion Tech.

Designed with sustainability in mind, the servos were sized to work out of the box as the most cost-effective solution. A holistic approach was taken, with motor drive and gearing all playing a role to reduce the power requirements of the machine. On average, the Mach-2 is expected to

generate energy savings of up to 25 percent compared with the first generation machine.

Nelson said that Rexroth’s IndraDrive Mi system combines each servo motor and drive amplifier into one compact unit mounted directly on the machine, outside of the control cabinet. A single cable running from the cabinet is daisy-chained to each motor/drive unit and provides both power and communication. As a result, Rexroth’s design has the potential to reduce a machine’s cabling needs by more than 80 percent. The IndraDrive Mi is also 50 percent smaller than a traditional servo system, which uses a separate servo drive and motor. This innovative architecture also eliminates the need for an air conditioning unit from the control cabinet and the need to maintain or replace expensive filters. Conventional servo drives are typically mounted in a large external control cabinet and are connected to the individual servo motors by separate communications, power and feedback cabling that must be mounted and run

through large wire ways that clutter the machine.

“Our machine has a cleaner appearance without all the wires running to and from the electrical cabinet,” said Grinager. “Because of the small integrated motor/drive units and fewer cables, the machine features an attractive walk-in design that allows easy access for the operator to clean and maintain it.”

“The integrated motor/drive units help reduce the size of the electrical cabinet,” added Nelson. Because the drives are integrated directly with the motors outside of the control cabinet, design engineers reduced the size of the Mach-2 control cabinet by 25 percent. Up to 20 IndraDrive Mi units can be connected from one power supply without additional distribution boxes. The IndraDrive Mi easily accommodates the multiple functions of the Mach-2 case packer without increasing the size of the electrical cabinet. In addition, integrating the drive control and motor into one component provides a more flexible “plug and play” capability. More motors can easily be installed for machine upgrades or other machine configurations such as unique infeeds, said Nelson.

Grinager said there was one additional advantage to using Rexroth’s motor/drive system: versatility. Although the compact IndraDrive Mi system allowed Brenton to design a machine with a significantly smaller footprint, reducing size by about 30 percent, the space in the machine’s case compression area was too compact to accommodate even the smallest integrated motor/drive unit. The solution was Rexroth’s



Mounted on the machine frame, the Rexroth IndraControl HMI uses a Windows CE-based platform and integrates easily with the rest of the control system.

IndraDrive Mi KMS, which is a distributed drive unit that can be mounted on the machine near a conventional servo motor and

seamlessly connected with the IndraDrive Mi KMS cables.

Brenton Engineering’s innovative controls team also used the IndraDrive Mi distributed input/output system (I/O), said Nelson. Having four I/O outputs directly on the motor eliminated the need for extra wiring and other costs associated with purchasing separate I/O outputs from another vendor.

Motion synchronization and control are handled through SERCOS digital communication to each servo drive. The case packer utilizes synchronous, electronic camming technology provided by Rexroth’s IndraMotion MLC L40 motion logic controller. The MLC L40 features Flex Profile functionality, seamlessly combining synchronous and time-based steps into a single data function which optimizes system performance and recovery and also reduces the changeover time.



The IndraDrive Mi has the potential to reduce a machine’s cabling needs by more than 80%.

In addition, Rexroth's IndraControl VEP 40 HMI, which was mounted to the frame instead of the control panel, integrates easily with the rest of the machine components via OPC communications. The VEP 40 is an embedded terminal with a Windows CE operating system and a high-performance 12-inch TFT touchscreen display.

Motion Tech provided an application engineer who was on-site for two days to help support Brenton Engineering's controls team after the machine was built. In addition, Motion Tech and Rexroth engineers conducted in-depth onsite training sessions for Brenton engineers.

"The Mach-2 has become a standard for Brenton Engineering," concluded Grinager. "Rexroth technology allowed us to simplify the design of the Mach-2 case packer and reduce extraneous parts and energy consumption in the machine. The ability to daisy-chain servo motors led to less wiring and contributed to a smaller electrical cabinet and ultimately an overall smaller machine footprint."



With IndraDrive Mi units, drives are integrated with the motors outside the control cabinet meaning fewer wires and a smaller cabinet, allowing for easy access and maintenance.

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