

Drive & Control profile

Driving new machine concepts, better performance with Rexroth IndraDrive Mi integrated motor and drive



Machine footprint is a main reason Aagard became interested in using Rexroth's IndraDrive Mi, an award-winning system that combines drive electronics and servomotor in a single, compact unit.

Packaging machine builder Aagard prides itself on tackling challenging engineering projects with breakthrough solutions. Recently, they began using Rexroth's IndraDrive Mi integrated motor and drive solution to create some unique advantages in their packaging equipment.

Innovation is the engine that drives engineering excellence. Original thinking combined with new technology is the best

way to tackle and solve persistent manufacturing challenges—too little flexibility, too much wasted energy or motion, limitations on

Challenge

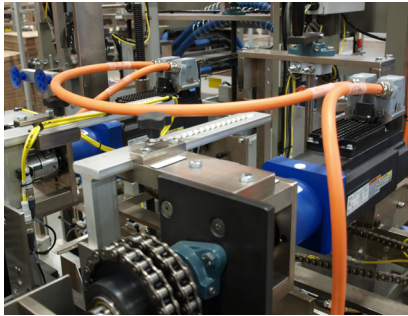
Help leading developer of “all-in-one, ready to run” packaging platforms add flexibility, save space, reduce machine cost and build time

Solution

Rexroth IndraDrive Mi integrated motor and drive system

Benefits

- 50 percent smaller than traditional system using separate servo drive and motor
- Reduces control cabinet space requirement by up to 70 percent
- Enables expanded use of servo drive technology without expanding machine footprint
- Reduces cabling needs by up to 85 percent
- Single cable provides both power supply and communication
- Eliminates need to cool control cabinets, reducing components and adding energy efficiency
- Fits into company's focus on integrating separate modules into one system



Aagard chose to utilize the IndraDrive Mi on a pilot machine, a combination case packer/unitizer machine with 23 axes of motion.

space or excess costs associated with using and maintaining less-efficient legacy technology.

These are the challenges The Aagard Group LLC of Alexandria, MN (www.aagard.com) is eager to take on. A builder of wraparound cartoners, case packers, sleeves and combination systems for the packaging industry, they are committed to the intelligent use of automation to build clean, simple, integrated systems to solve their customer's unique manufacturing issues.

Creative technology that integrates once-separate modules into complete solutions is something Aagard is passionate about—which is why they've built a strong relationship with drive and control company Bosch Rexroth, making extensive use of Rexroth's innovative **IndraDrive Mi** integrated motor and drive system.

A Passion for Unique Challenges
Founded in 1997, Aagard is committed to "redefining the standard" for packaging machine development, combining a passion

for innovation with experience in designing successful integrated solutions for its customers.

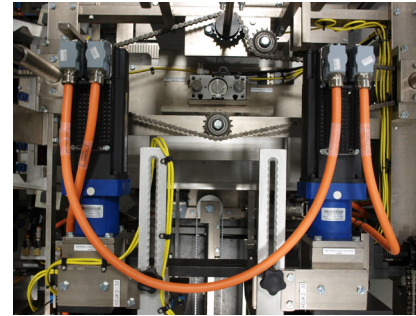
"In many cases packaging machine developers come up with a standard machine design for a given application and then try to sell it to as many other customers as possible" said Tory Bjorklund, Chief Technology Officer at Aagard. "We're committed to a different model. We work with companies that are looking for an innovative design they can't get elsewhere," he said.

Key industry challenges, such as reducing machine footprint, achieving greater production flexibility (i.e. running multiple package configurations on one line) and efforts to reduce energy consumption are often solved by Aagard by integrating previously separate machine functions into a single machine—an approach that produces solutions that are "all-in-one, ready to run."

"For example, if you're trying to increase throughput on a particular line, you often have to consider the processes from several pieces of machinery. The bottleneck may not be one particular machine but a combination of all the machinery in the line designed for the previous speed," he said.

Leveraging the Latest Servo Technology

An essential technology for solving these challenges is the latest generation of intelligent electric servo drives and motors.



The IndraDrive Mi features a single cable combining power and SERCOS communications, which can reduce the cost of cabling motors and drives by up to 70%, and can enable up to 20 IndraDrive Mi's to be daisy-chained on a single circuit.

Servo systems offer features such as encoder feedback for more automated control and diagnostics. Servos also let Aagard create integrated solutions combining side seam gluing, cartoning, case packing and palletizing into a single line, while giving packaging operations the ability to meet today's constantly changing consumer preferences.

"One of the challenges that we take on is the range of product that is coming through our machines," Bjorklund said. "Some machines run 15 to 20 recipes, from large club multi-packs down to single-serving packages. The range of motion we get from intelligent servo systems allows us to solve those problems as well," he said. "At times, we've been able to replace multiple lines with a single line as a result of that flexibility."

Another operational challenge for packagers is efficiently restarting a machine after clearing it from a product jam. This is accomplished

by designing features into the machines that keep “mean-time-to-recovery” to a minimum. To do this, Aagard leverages servo drive’s ability to provide “smart recovery.”

“We can recover from sudden machine stops, to clear machinery jams for example, much faster because the servo drives remember where each axis was in the motion sequence, and can immediately resume production without having to reset everything and restart the machine.” said Noel Schonberg the head of Aagard’s controls development.

Space savings drive initial interest in IndraDrive Mi

Helping control machine footprint, without sacrificing the operational advantages of servo drive technology, is why Aagard is making greater and greater use of Rexroth’s IndraDrive Mi in its “all-in-one” combination machines, particularly those with 10 or more servo driven axes.

According to Bjorklund, the use of servo drives has helped Aagard reduce machine footprint, but it can also create other design challenges. Servo drives are typically mounted in separate control cabinets and connected by separate communications, power and feedback cabling that must be mounted and run through machine spaces, and the drive enclosures on large machines with 20-plus axes often require air conditioning, adding to equipment costs and energy use.



Use of the IndraDrive Mi also eliminated one entire control cabinet enclosure, and the attendant air conditioning unit normally required.

“The more servo drives you add, the more enclosures are needed, and soon we found that a significant part of our machines were covered up with enclosures,” he said. This added to machine footprint, and also complicated machine access for clearing and maintenance, a significant drawback. “What the IndraDrive Mi technology allowed us to do with the drive mounted on the motor, was to keep the smaller footprint without all the restrictions of those enclosures,” he said.

The IndraDrive Mi combines a traditional servo motor and drive amplifier into a single compact, versatile unit. Since the drive is integrated into the motor, machine designers can reduce control cabinet size by up to 70% and in some cases eliminate entire drive enclosures and air conditioning equipment.

The IndraDrive Mi also integrates both power and communications into a single cable and up to 20 IndraDrive Mi units can be connected in a “daisy chain” to one power supply without additional distribution boxes. This results in a savings of up to 85% in cabling

compared with configurations using separate power and communications links.

Testing and Assessing IndraDrive Mi Performance

The advantages of the IndraDrive Mi’s integrated drive and motor system, for Aagard’s integrated “all-in-one” machine, appeared obvious. And while Aagard appreciated the efficiency of this integrated solution, they performed their own testing to make certain that communications between drives and machine control was free from electrical interference.

“We were able to confirm that the SERCOS II communication was stable and could support our motion control platform,” Schonberg said. Although some adaptation was required, integration and communication proved comparatively easy and Aagard is confident the IndraDrive Mi can be used for packaging solutions for many of the company’s customers.

Proving Value on Pilot Casepacker/Unitizer

Aagard chose to utilize the IndraDrive Mi on a pilot machine, a combination casepacker/unitizer machine with 23 axes of motion. They subjected the system to extensive drive testing and were able to assure the customer that the IndraDrive Mi delivered the required performance and reduced machine footprint.

From Aagard’s perspective this first machine proved that the IndraDrive Mi helps answer some of Aagard’s unique engineering and machine design challenges

for the packaging industry. For example, the integrated power/communications cabling and the ability to daisy-chain multiple IndraDrive Mi's helps simplify and clean up machine design:

"We did get a 60 to 70 percent cable reduction," Schonberg said. "It saves in cable routing and cleans up the look of the machine and eliminates places where product can potentially build up—that's a very big deal in the food and packaging industry.

On the pilot machine, use of the IndraDrive Mi also eliminated an entire 36" x 70" control cabinet enclosure, and the associated air conditioning unit normally required. Also, the yearly energy savings from eliminating the air conditioner is a benefit for our end customers. It made designing machines with high numbers of servo axes easier," Schonberg said.

"There were times on machines with 20 or more servo drives where we would decide that it was cost-effective to have two drive enclosures in separate locations, so we wouldn't need air cooling for the drive cabinet," he said. With the IndraDrive Mi, Aagard is no longer forced to make those kinds of tradeoffs, which hindered machine accessibility and costs.

From a cost perspective, Aagard is convinced the IndraDrive Mi offers savings for machines with 10 or more axes through elimination of drive enclosures, air conditioning equipment and reduced cabling, which its customers benefit with better diagnostics/messaging, accessibility for maintenance, changeover, and reduced lead time.

Savings are also achieved through faster machine assembly, by reducing the number and complexity of multiple power, feedback and communications cables from drive cabinets to every axis of motion. Aagard was able to reduce its electrical assembly time related to wiring the servo drives and cables by over 80 percent, because the company was able to purchase the manufactured cables instead of building them, thus reducing the number of cables needed per drive by half.

Successful Performance Drives Expanded Use

According to Bjorklund, one of the clear advantages associated with using the IndraDrive Mi is the technical support and strategic relationship the company has established with Bosch Rexroth—especially since establishing strategic relationships is a core component of Aagard's entire business philosophy.

"Having productive partnerships with our clients and our technology suppliers is an important part of our business model," Bjorklund said. "We received a lot of technical support integrating the IndraDrive Mi with our controller from Rexroth, including having one of their applications engineers on site here working with us; we wish that our other vendors provided the same level of support that we've received from Bosch Rexroth."

The success of the pilot machine has led Aagard to expand its use of the IndraDrive Mi to well over 50 machines. It provides an effective, integrated solution that allows Aagard to make full use of servo drive technology while conserving machine footprint, eliminating enclosures, saving energy and making routine access to machine spaces simple and easy.

"At Aagard, we have a culture that cultivates creative engineering solutions, and the benefits the IndraDrive Mi offers our integrated, servo-driven systems is something we hope to expand in the future."

Rexroth
Bosch Group