

Drive & Control profile

Bosch Rexroth Serves Up One-stop Drive and Control Package for Sabel Engineering Bottom Loader



Sabel Engineering's casepacker seamlessly integrates multiple Bosch Rexroth products.

Smaller footprint, higher performance, reduced maintenance and easier setup—SE-15 bottom-loader uses linear motion and servo drive system from Bosch Rexroth.

When Herb Sabel pioneered the original bottom-loading casepacker nearly 40 years ago, it was an idea that revolutionized automatic case packing. Since then, hundreds of

Sabel-engineered case packers are used worldwide.

Today, Sabel Engineering (Sonoma, CA www.sabelengr.com) is using sophisticated automation

Challenge:

Develop compact bottom-loader packaging machine with better performance, low maintenance and a user-friendly control interface

Bosch Rexroth Integrated Drive and Control Solution:

- CKR belt drive compact modules
- EcoDrive intelligent servo drives
- MKD servo motors with absolute encoders
- PPC motion logic and robotic controller
- VEP HMI operator panel
- IndraWorks (IndraLogic and VisualMotion) software

Results:

- Seamlessly integrated end-to-end control system
- Handles 240 units per minute and forms, packs and seals 15 cartons per minute
- Compact design, smaller footprint
- Use of standard components requires less engineering effort for design, installation and changeovers
- Easier set-up and maintenance

and motion control to continuously improve its casepackers while reducing machine size and the need for maintenance. To achieve these goals, the company enlisted an integrated Bosch Rexroth drive and control system solution.

Sabel's packaging machinery engineers turned to [Bosch Rexroth](#), the one company that could provide the integrated components and technical support for both linear motion and machine control. With expert application engineering, local distribution, and reliable products, Bosch Rexroth helped Sabel create yet another class-leading machine: the SE-15 customized bottom-loading casepacker.

Sabel's servo-driven eight-axis casepacker maximizes output in a 12' x 12' footprint. It can handle up to 240 units per minute in a wide variety of sizes, and 15 cases per minute. Essentially, the SE-15 forms the corrugated cases, fills them with individual or groups of product units, and then closes and seals each case, all in one compact machine.

Integrated Products and Partnership

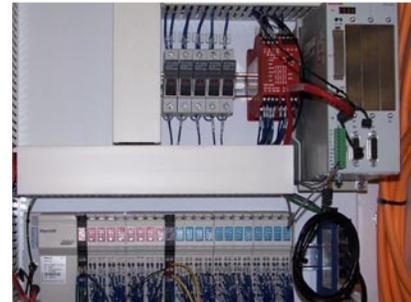
Collaborating with local Bosch Rexroth automation distributor [Applied International Motion](#), A Womack Company (A.I.M.) in La Verne and Benicia, CA (www.aimotion.com), Sabel seamlessly incorporated multiple Bosch Rexroth products to help with the machine's automation needs.



Key components of the control system include Rexroth's digital intelligent servo drives, PPC motion logic and robotic controller, and inline I/O modules.

CKR belt drive compact modules from the company's [Linear Motion and Assembly Technologies](#) group (Charlotte, NC) are tied in with a drive and control platform—including EcoDrive intelligent servo drives, MKD servo motors, PPC controller, bus coupler, I/O modules, and a VEP HMI—from the company's [Electric Drives and Controls](#) group (Hoffman Estates, IL). With these standard Rexroth components, initial set-up and maintenance efforts are significantly improved because the components are ready for installation right "out of the box."

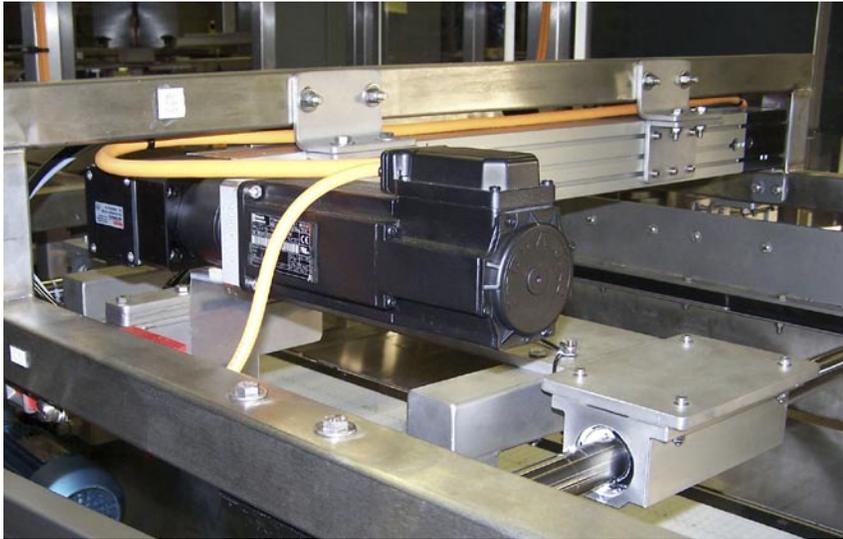
"We worked very closely with AIM and the Bosch Rexroth engineers, both on-site and remotely, to develop the motion system," explained Hitan Patel, electrical



engineering R&D manager at Sabel Engineering. "Their superior support has been a very helpful resource during the development phase of the SE-15."

Multiple Technologies, One Source

The SE-15 machine utilizes two 1.5-meter horizontal and vertical Rexroth [CKR modules](#), enabling a compact machine design. Each ready-to-install module consists of a belt-driven carriage guided by two parallel size-20 [Ball Rail](#)® guides with two runner blocks per rail. Sabel's hardware is attached to the CKR carriage, which is powered by a



The compact size of Rexroth's CKR actuator and motor combination creates more space for the payload and results in a smaller machine footprint.

servo motor and travels end-to-end to move product or cartons. The twin Ball Rails provide exceptional moment load capacity in all directions for increased payload and smooth, low-friction travel at speeds up to 5m/s.

The compact size of the CKR actuator and motor combination creates more space for the payload and results in a smaller machine footprint. In addition, since the CKR module is available with standard carriages and gearboxes with various motor mount options, ordering the modules is easy and the components are prebuilt and ready for integration upon delivery.

“The compactness and functionality of the CKR modules are key benefits in our system design,” states Patel. “We can order them off-the-shelf and install the components quickly

without pre-design engineering, which significantly improves our production timeline.”

The SE-15 control architecture features a tightly synchronized end-to-end control system sourced entirely from Bosch Rexroth. Because all the components are designed to work together, Sabel’s engineering efforts were significantly streamlined, and compatibility issues were eliminated.

Each of the machine’s eight axes is driven by a Rexroth EcoDrive digital intelligent [servo drive](#) connected to a Rexroth MKD [servo motor](#) with multi-turn absolute encoder feedback. The advanced drives store a large quantity of customer-programmed positioning profiles. Position loops are closed at the drive rather than at the motion controller. In addition,

all velocity, acceleration and stop control is processed at the drive level, enabling more responsive performance. The drives are also capable of taking external position commands from a variety of sources, including discrete I/O.

Another key component of the system is the high-performance scalable Rexroth [PPC controller](#), an open Power PC-based motion logic and robotic controller with I/O combined into a single unit, replacing a typical PLC.

Using a fiber-optic SERCOS ring, the PPC communicates with each drive. The PPC also has the ability to communicate to the outside world in a wide variety of protocols, including Ethernet



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and Profibus, and via various fieldbus and OPC standards. In addition, Bosch Rexroth provided the [inline I/O modules](#) which can be used as either local discrete I/O landing points, or extended via fieldbus interface to remote I/O applications.

Unlike traditional PLC systems, the Rexroth controller enables Sabel to use just one program—Rexroth’s [IndraWorks](#)—to set up both motion control and related motion plus process I/O where needed.

“Rexroth’s software package allows us to program in ladder logic, which enables our customers to more easily maintain and troubleshoot the system,” said Patel. “Being able to use Bosch Rexroth as a one-stop solution for the entire system—from components to software and support—is a winning combination for us.”

A Rexroth [IndraControl VEP](#) series HMI operator interface rounds out the SE-15 control system. The VEP allowed Sabel to create user-friendly customized graphics for

the operator. Preprogrammed graphical tools are embedded for the programmer, making it easy to add diagnostic and control functions, such as alarms, trends, graphs, and recipe selection.

Perfect Combination

The combination of Sabel Engineering’s innovative machine ideas, Bosch Rexroth’s application and product expertise, and the local support of master distributor A.I.M. led to a very successful product in the SE-15. The end result is a customized casepacking machine built on standard components—embodying the best of both worlds in flexibility and hardware to address the needs of the consumer food and pharmaceutical packaging industries.



Rexroth
Bosch Group