STXiMotion

Flexible Motion Control Opens the Door to Packaging Machine Innovations

Adding robots, motion control axes, or material handling operations can be expensive and requires nonrecurring engineering, training, and maintenance costs. The softMC compact motion controller adds multi-axis motion control or robotic capabilities to your packaging system at industry-standard gateway costs.

Keeping pace with Industry 4.0 requires deploying advanced technologies to enable machine-to-machine communication and to provide end-to-end enterprise visibility and the productivity gains that come with those insights. Through improved communications, Industry 4.0 also forges a pathway for companies to innovate and expand their machine capabilities. The same holds true for automated packaging machine original equipment manufacturers (OEMs) and end users. They might bring in robots or add motion control axes or material handling operations, for example. For proof, consider the impact that COVID-19 had on the logistics, warehousing, and packaging industries in 2020. The "new normal" shows us that companies need to flexibly adapt to changing conditions.

At the same time, market conditions have imposed limits in the packaging industry. For example, packaging equipment customers may prefer certain vendors based on familiarity with a particular product line. Unfortunately, this can limit a packaging equipment supplier's ability to innovate — both in terms of new commissions and retrofits to upgrade existing equipment. If the programmable logic controller (PLC) doesn't talk to a new robotic work cell, the only solution is often an expensive new PLC and a subsequent hardware upgrade, as well as nonrecurring engineering (NRE) and the training and maintenance costs that come with it.

KEY BENEFITS:

- No costly retooling
- No complicated interface
- No-hassle, real-time I/O communication
- No complicated programming

MOTOR TYPES SUPPORTED:

- Brushless servo motors
- Brushless permanent magnet motors
- Direct drive linear permanent motors
- Direct drive (torque) motors
- DC brush motors
- Integrated motors
- Voice coil motors
- Low-voltage motors

ROBOT TYPES SUPPORTED:

- Puma
- Delta
- SCARA
- Gantry
- Cartesian
- 4-bar arm
- Custom configuration

FEEDBACK DEVICES SUPPORTED:

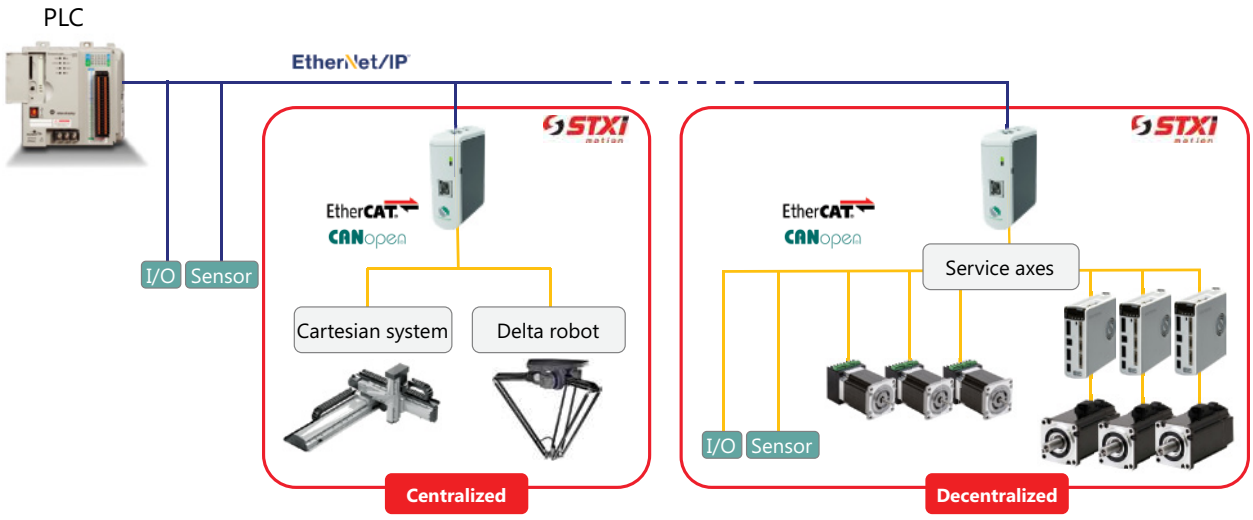
- Digital incremental (AqB) encoders
- Hall sensors
- Analog (sine/cos) encoders
- Serial communication encoders
- Resolvers

Control System Axes, Communicate with Allen-Bradley PLCs

A more cost-effective solution involves the use of flexible compact motion controllers that enable any major OEM PLC to control any motion control component, including robots, drives, and motors from dozens of different suppliers. The softMC, is an example, and costs the same as a network gateway. Developed by Servotronix with an EtherNet/IP interface developed by STXI Motion, the compact microcontroller provides packaging equipment suppliers the flexibility and controls they need to innovate and optimize customer solutions. In addition to the savings from shorter design and commissioning times and lower maintenance and inventory costs, the new softMC delivers Industry 4.0 machine-to-machine communication and controls capabilities for much less cost than traditional offerings by functioning as a motion controller for all system axes and as a communication gateway to Allen-Bradley (Rockwell Automation) PLCs.

The softMC provides two methods for designing and integrating additional motion axes and/or robotics capabilities: a centralized and a decentralized method. The centralized method lets machine builders design and use standard robot models such as delta, Cartesian, and gantry robots. The controller provides advanced motion control of the motors, robots, or robotic controllers while handling all communication between the material handling systems and the Allen-Bradley PLC. Given that most robotic systems cannot connect directly to an Allen-Bradley PLC without additional expensive control hardware and software, the softMC performs what used to be an impossible feat for most operations.

Robotics controller and gateway to motion enables end-of-line packaging innovation.

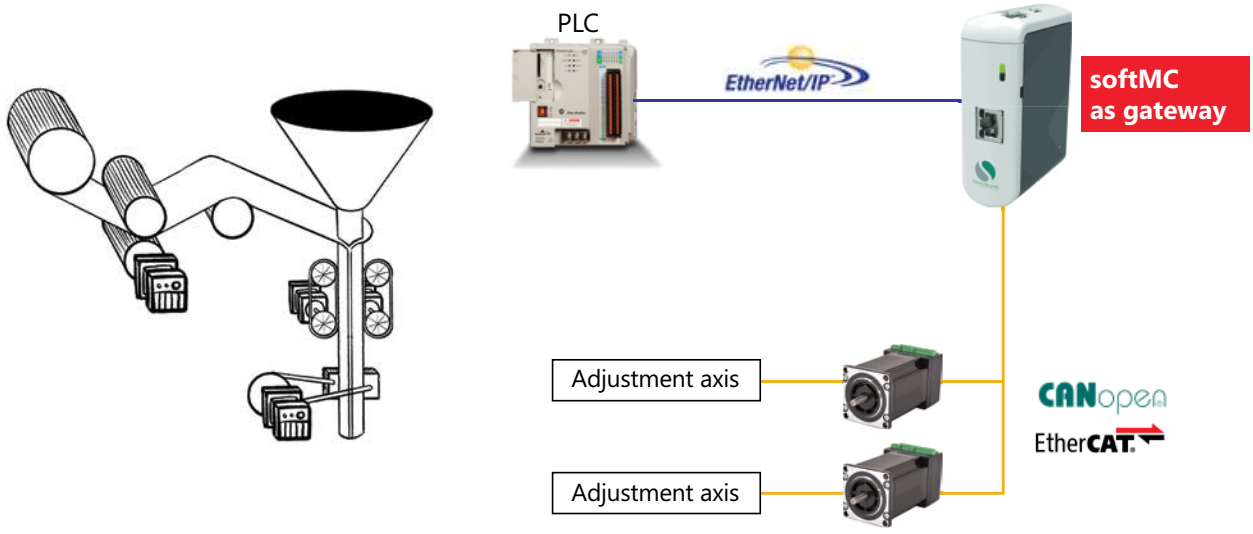


The softMC compact motion controller enables the design and integration of additional motion axes and/or robotics capabilities in centralized and decentralized methods.

The decentralized method allows machine builders to customize a system using motors and drives from the STXI Motion product portfolio, which are optimized and ready for use with the softMC. The axes perform flexible, automated application tasks, while the softMC serves as a gateway to the Allen-Bradley PLC, allowing the microcontroller to communicate with a robot or motor in scenarios where it previously could not. Some solutions even combine the centralized and decentralized methods using just one softMC to control all motion elements in the packaging line and to communicate with the PLC.

Application: Vertical Form Fill Seal Packaging Machines

For decades, STXI Motion, through the Servotronix product line, served numerous material handling industries, including the packaging industry. Recently, the company introduced the advanced capabilities of the softMC to the packaging industry with the aim of empowering packaging equipment suppliers to innovate, adding robotics for box-in-place, palletizing/depalletizing, and many other packaging applications.



The softMC offers a low-cost solution for add-on adjustment axes in systems such as vertical form fill packaging machines.

For example, a customer recently approached STXI Motion with a request to help reduce system costs, inventory, and manufacturing complexity for two packaging machines. One machine was based on a Beckhoff PLC and the other on an Allen-Bradley PLC. The company wanted one motion solution for both machines, but Beckhoff uses Ethercat and Allen-Bradley uses EtherNet/IP. Enter the softMC, which provides a communication gateway between motors and PLCs, supporting independent motion of more than 50 axes. Now the PLC type represents the only difference between the two machines, and the customer can stock one set of drives and motor technologies for all machines.

In the same scenario, the customer sought to add a robot to an existing packaging solution to pick-and-place bags from machine to conveyor. Specifically, the customer looked at buying a delta robot from a known manufacturer, which would have required the purchase of a robot controller from the company. With the softMC installed on the machine, the existing solution can drive three or four more axes, adding delta robot capability without the need for a robot controller, and for a fraction of the price, by using a nonproprietary robot such as one from Codian Robotics. Doing so saves money and enables the customer to deploy whatever type of robot it chooses — either with or without a robot controller — since the softMC allows companies to build their own solution or to use a third-party option that is agnostic to motion control.

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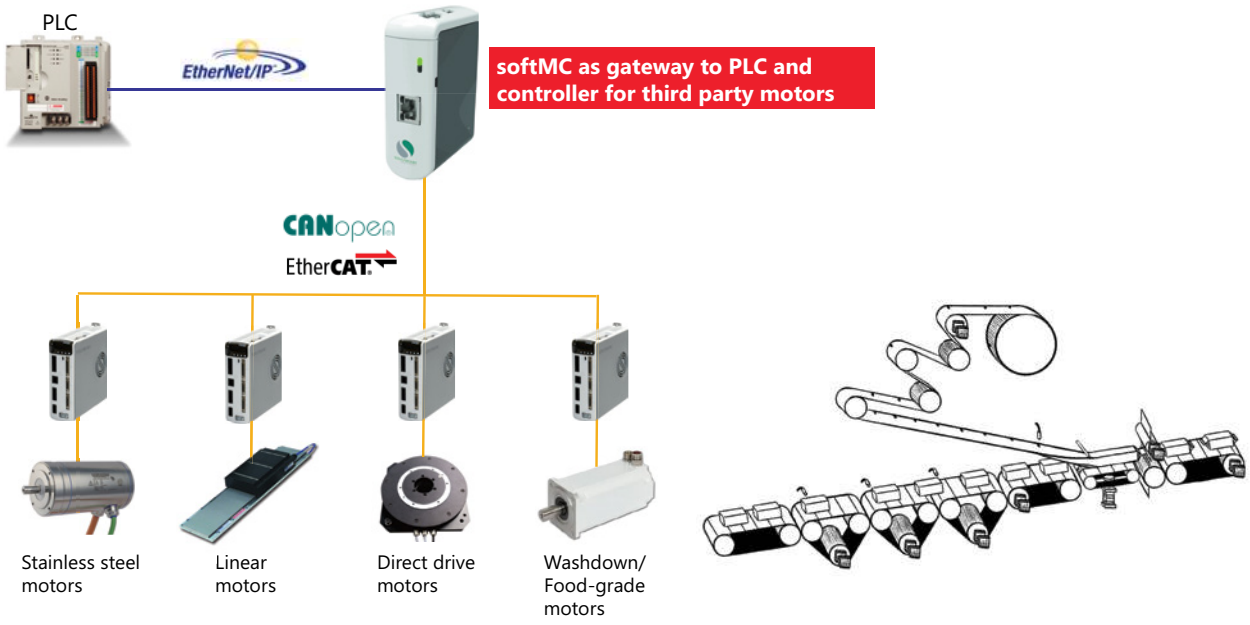


Integrating any third-party motor into a food packaging system is made possible with the softMC motion controller.

Application: Paint Pens, Food Processing, and Third-Party Motors

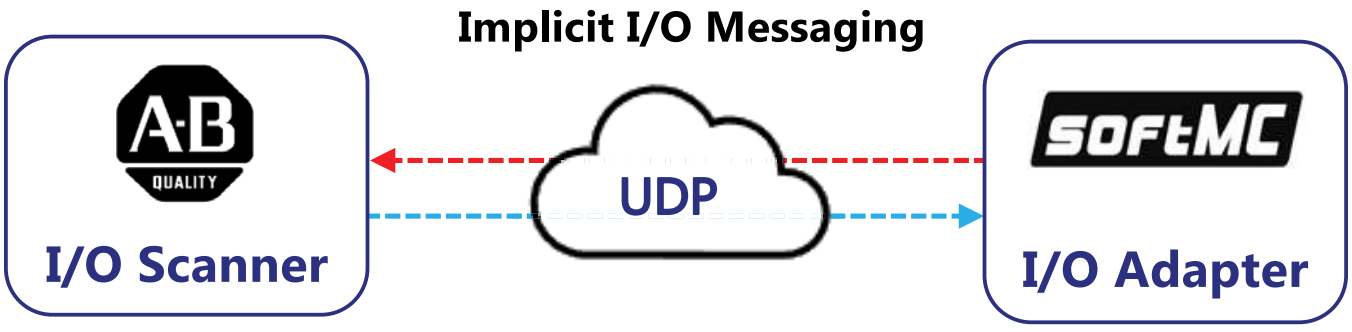
Customers in hazardous chemical production often need the ability to control many different types of motors, including explosion-proof motors. Recently, a customer that builds filling machines for paint pens needed to add an explosion-proof motor in the filling head operation. Unfortunately, explosion-proof motors require a different drive than what was installed on the system. By switching both drives to the softMC, the OEM could accommodate existing equipment designs, control all the motion, reduce part inventories, and increase reliability while protecting life and limb with the addition of an explosion-proof motor. As an added benefit, the softMC's flexibility necessitated no changes to the customer's electrical panel, eliminating the need for retraining. One PLC and one controller communicate with all the drives on the electrical panel.

Another example where the softMC's flexibility adds value involves food packaging wrapping systems and their need to combine multiple types of washdown and food-grade motors and drives. By deploying the softMC into a system, a customer can use the controller as a gateway between the PLC and virtually any third-party motor, such as a stainless steel, linear, direct drive, or washdown/food-grade motor. The softMC proves useful because linear motors and direct drive motors may not be directly accessible from the Allen-Bradley environment. This saves money on hardware costs and engineering time spent on adding new motors while removing the need to change existing electrical panels or retrain operators on the equipment.

Flexibility with Communication Protocols

Rockwell Automation's integrated line of control products has stood the test of time. It is fair to say that most North American OEMs and end users rely on the company's products for their packaging machines. Doing so requires that a customer purchase only devices with EtherNet/IP for communication. For some OEMs and end users this may be—and quite often is—fine, but others may require devices that use a different communication protocol. With the softMC, the cost of integrating robotics into packaging systems can be reduced to just hundreds of dollars. The controller provides advanced motion control and a seamless connection to Allen-Bradley networks at the same cost as an industry-standard gateway. Machine builders can continue using Allen-Bradley PLCs in their systems while opting for motors and devices from their preferred suppliers.

Due to COVID-19, people turned to e-commerce platforms such as Amazon, Walmart, and online grocery shopping at unprecedented rates for their basic needs last year. This placed a huge demand on companies involved in logistics and



softMC handles motion control while maintaining real-time I/O communications with the PLC over implicit EtherNet/IP protocols.

packaging, which were forced to constantly expand and scale operations to keep up. Instead of adding on to or replacing entire machines, companies can use the softMC to retrofit an existing packaging machine to quickly enhance capabilities and productivity with components such as robots, adding immediate value. The softMC and Allen-Bradley environments exchange messages directly using EtherNet/IP communication protocols. While Rockwell Automation's PLCs and Studio 5000 software manage and monitor work cell performance, the softMC controls electromechanical motion systems and auxiliary axes by sending EtherNet/IP motion messages over CANopen or EtherCAT networks.

A Full Robotics Controller and Gateway to Motion

In terms of ease of programming, integrated STXI Motion and Allen-Bradley systems are supported by Allen-Bradley CompactLogix and ControlLogix PLCs using Studio 5000 versions 32.01, 31.01, 30.02, 28.03, 24.02, and 20.05. The Studio 5000 design environment is used to program, configure, and maintain the system. Add-on instructions from STXI Motion give integrators a simple way to interface Allen-Bradley control systems with robotic systems and motion devices.

softMC motion controller enables multi-axis, auxiliary automation capabilities in food packaging.

> *"For approximately $500, the softMC provides a full robotics controller and gateway to motion, and the ability to communicate with all motor technologies and feedback devices."*

The softMC gives packaging machine OEMs and end users the ability to add new capabilities to their existing setups, increasing productivity and revenue. Other motion control products on the market provide EtherNet/IP connectivity, but most do so at single-axis drive levels. The softMC was designed initially for the robotics and general motion control industries at a cost point that the packaging industry probably has not seen. For approximately $500, the softMC provides a full robotics controller and gateway to motion, and the ability to communicate with all motor technologies and feedback devices. Furthermore, the motor or indexer can be from any supplier, giving OEMs and end users the ability to explore and to advance their packaging machines beyond what they now have.

When is the last time you innovated? If you don't like thinking about that answer, please connect with Alex Lee at Alex.Lee@stxim.com. You can also learn more about the product here: https://stxim.com/product/softmc-301-compact-motion-controller/

Robotics controller and gateway to motion enables end-of-line packaging innovation.

- Modular, add-on solution for advanced control of single-axis and multi-axis motion tasks
- Plug-and-play robotics integration with existing systems and machine interfaces
- Requires no changes or modifications to Rockwell Automation control architecture or PLCs
- Complete motion systems with drive-motor bundles or electromechanical modules
- A multi-axis motion controller and gateway to Allen-Bradley PLCs for the price of a network gateway

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