

## Solutions in Action



Allen-Bradley GuardLogix 5580  
Safety Controllers



Allen-Bradley Kinetix 5700 EtherNet/IP  
Servo Drive



Rockwell Automation  
Independent Cart Technology



Eagle Technologies designed this prototype lithium-ion battery assembly and test system based on independent cart technology.

Electric vehicles continue to gain traction in the marketplace, thanks in large part to advances in battery technology that have extended range beyond 300 miles. For manufacturers, the next hurdle is making lithium-ion battery production more efficient – and electric vehicles more affordable for a broader consumer base.

Optimizing automotive manufacturing processes is nothing new for machine builder Eagle Technologies. Headquartered in Bridgman, Michigan, the company has served the automotive industry for over 50 years and has delivered turnkey assembly and test systems for nearly every vehicle component.

As electric vehicles have advanced, Eagle Technologies has been on the cutting edge of new technology with prototype development and production systems for both batteries and motors.

Recently, Rockwell Automation approached Eagle Technologies to develop a prototype lithium-ion battery assembly and test system for the new Rockwell Automation® Electric Vehicle Innovation Center, located in San Jose, California.

“Our prototype assembly and test system incorporates smart machine technologies that are now available across our broad portfolio,” said Brandon Fuller, senior vice president, partner, Eagle Technologies. “These IIoT technologies and cloud services enable better communication, remote monitoring and equipment self-diagnosis – and help improve product quality and machine uptime.”



Battery assembly and testing is a complex and exacting process. It involves transporting battery components to a series of processing stations including battery pack loading, adhesive dispensing, plasma cleaning, wire bonding and intermittent testing – while maintaining tight tolerances at every step.

“While accuracy is important in all assembly applications, tolerances are particularly tight in battery assembly,” explained Fuller. “Precision is critical because how a battery is assembled directly impacts battery productivity once it’s installed in a vehicle.”

In previous battery assembly applications, Eagle Technologies had used belt-type conveyors and other conventional methods for transporting components from station to station. Now, the company planned to optimize speed and performance with a new design featuring Rockwell Automation intelligent motion control and independent cart technology (ICT).

Based on linear synchronous motors, ICT enables the independent control of multiple magnetically propelled movers. The prototype machine includes two conveyance systems. One system, based on the iTRAK® intelligent track system, manages initial battery cell handling, including transport to verification steps and battery pack loading.

The second system, based on the MagneMover® Lite intelligent conveyor system, carries the battery module housing. It receives the battery module from the depalletizing station – and transfers the product to processing and testing stations.

Unlike conventional conveyance methods that operate at a constant speed, the iTRAK and MagneMover Lite systems are programmable for deceleration, speed and positioning. As a result, the solution can speed up between some processing steps and slow between others as needed, resulting in more efficient system overall.

In addition, while the prototype machine includes barcodes for tracking, ICT technology enables product tracking based solely on encoder position – without barcodes or RFIDs.

The control system also includes Allen-Bradley® GuardLogix® 5580 safety controllers, Allen-Bradley Kinetix® 5700 and 350 servo drives, Allen-Bradley LDC-Series™ linear motors and Allen-Bradley VersaView® ThinManager® thin clients. The solution is integrated on an EtherNet/IP™ network.

While the LDC-Series linear motors control the wire bond process, FANUC® robots handle depalletizing, plasma cleaning and adhesive dispensing. FANUC is an Encompass™ Product Partner in the Rockwell Automation PartnerNetwork™ program, and Eagle Technologies is a FANUC Authorized System Integrator.

“We have designed the machine to be 100 percent automated and configurable for changeover,” said Fuller.

The prototype is configured to assemble two types of battery modules – an economy model and a long-range model. Changeover involves simply selecting the correct mode from the operator interface.

Eagle Technologies is also pleased with the performance gains they have achieved on the prototype machine.

“Our past experience with conveying battery products has typically been on chassis that are about half the speed of iTRAK and MagneMover Lite,” Fuller said. “The prototype maintains tight tolerances – at a much higher rate of speed.”

But for Eagle Technologies, perhaps the real beauty of the system is its adaptability to other applications.

“The technologies we are demonstrating are not battery-specific and should pique the interest of a wide range of companies,” Fuller said. “We now have the iTRAK and MagneMover Lite building blocks and can configure them to fit any assembly application – whether it be a battery, electronic circuit board or medical device.”

“And that’s where we save on our end,” Fuller added. “Thanks to reusable engineering and standard technology, we can design our machines more efficiently for any industry and deliver them faster.”

### **For more information:**

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