ADLINK
LEADING EDGE COMPUTING



ADLINK EtherCAT Boosts Production and Improves Yield for Lithium-ion Vehicle Battery Manufacturer

Use Case

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Overview

Electric vehicles have seen phenomenal growth during the last few years. As the cost of fuel increases and government initiatives encourage investment, the EV market could realize a 23.35% CAGR over the next five years (LINK). However, this rise in demand puts pressure on the upstream suppliers and manufacturers to meet larger orders in a shorter time, forcing them to seek new and innovative ways to increase the efficiency and overall yield of their existing manufacturing systems.

Battery manufacturers, whose batteries form a critical component for EVs, are having to reassess their production systems to increase their output, by stepping up the pace of production and by increasing the usable yield. Manufacturers can achieve both these goals through higher precision during manufacturing and the synchronization of multiple axes and I/O points throughout the production process, including machines such as mixers, coaters, roll presses, and lamination machines.

Battery Manufacturers Struggle to Attain High Efficiency With Multiple Sensors and Axes

Synchronization across automated systems and the limitations of legacy systems, often lead to non-optimal yield rates, but have, until recently, served their purpose. However, traditional control technologies such as MotionNet and High Speed Link use the RS485 communication protocol which provides less-than-optimal transmission efficiency. As the quantity of sensor data and the number of sensors increases, so shorter cycle times and precision synchronization become more critical. In order to meet these new requirements, a newer, high-performance industrial automation system is needed for the synchronization of multiple axes and I/O points in distributed motion control operations.

Intelligent precision manufacturing can easily be the deciding advantage in guaranteeing success and competitiveness for electronic device manufacturers, so battery manufacturers are eager to switch their multi-step single-axis controls to multi-axis synchronous control that can reduce the number of steps in their processes, thereby increasing the overall output, and in turn reducing the cost of production.

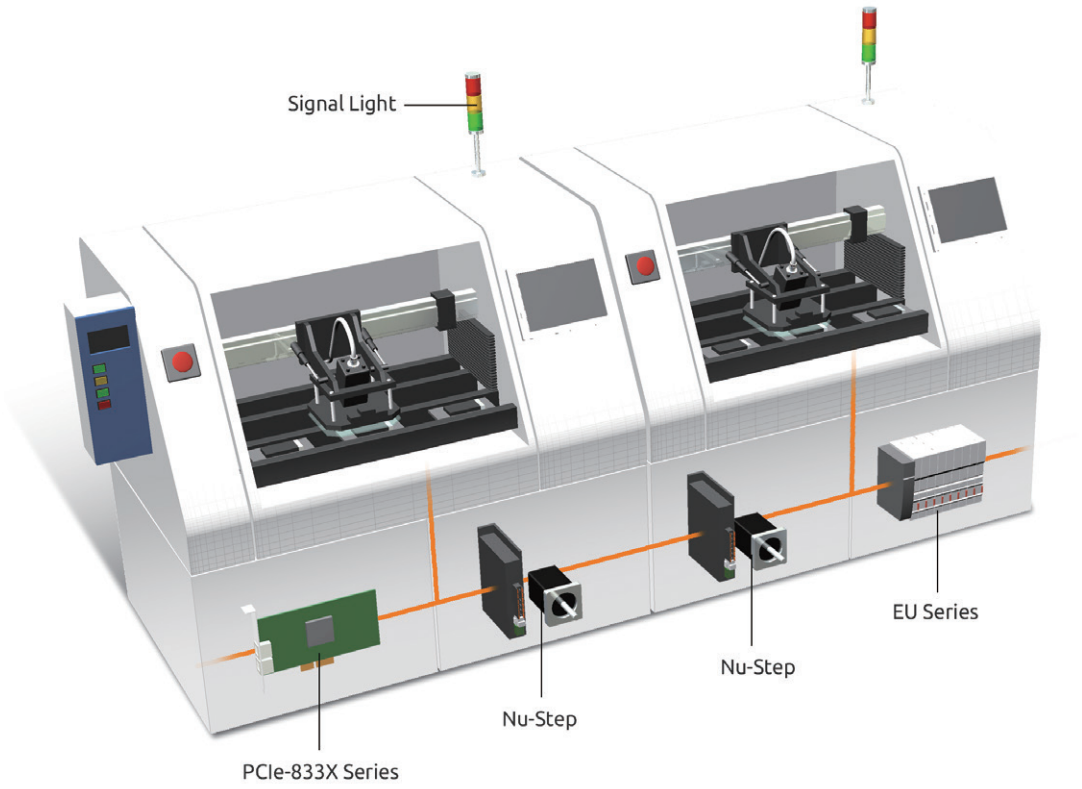
ADLINK EtherCAT Multi-axis and Multi-I/O Synchronous Control Streamlines Battery Manufacturing Processes

ADLINK's EtherCAT solution has enabled the automotive battery equipment supplier to achieve a 20-30% increase in production yield and a 15% reduction in production costs, enabling it to ramp up production to meet the growing demand, and providing a significant boost to its competitiveness. Both of these goals were realized by switching from their legacy setup with simple synchronous actions to multi-axis synchronous actions and I/O points throughout the production process, including roll presses, coaters, lamination machines, mixers, and other machines.

ADLINK's new-generation EtherCAT solution integrates hardware and software elements to enable fast, high-performance industrial automation applications with many ready-to-use features, speeding the development, deployment, and expansion of Industrial IoT-based modern smart factories.

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- **Improved synchronization** ADLINK EtherCAT provides high motion synchronization capability ≤200nS with performance of 64-axis, maximizing throughput.
- **Simple upgrade** APS function library support simplifies the upgrade to EtherCAT-based motion control and provides motion control users with the ADEs, libraries, and drivers to easily upgrade to EtherCAT-based motion control without complicated program modifications or application redevelopment.
- **Lower TCO** ADLINK's EtherCAT solution reduces costs up to 70% on every single axis over non-EtherCAT motion control. High flexibility for multi-axis motion control systems on both EtherCAT and non-EtherCAT motors eliminates the need to discard old equipment, reducing TCO across the entire motion control system.
- **Simplified cabling** Now, with EtherCAT, a single Ethernet cable can connect all slaves, eliminating the division of process steps into multiple actions due to hardware limitations and slow, complicated cross-module synchronization.
- **Multi-axis synchronization** Now, the new multi-axis and cross-module synchronous action has enabled giant leaps in productivity.



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ADLINK EtherCAT Solution

ADLINK's EtherCAT solutions offer the hardware and software with superior performance to support multi-axis, multiple I/O motion control. The PCIe-833X EtherCAT master controller, EU series EtherCAT slave system and modules, and Nu-Step drivers were used for the lithium-ion battery smart factory.

- **PCIe-833X EtherCAT Master Controller**

  PCI Express® x1 EtherCAT motion controller, with 64-axis motion and 10,000 I/O point control, 250μs cycle times, various EtherCAT slave options, and a dedicated emergency stop input. Application-ready function library for easy motion and I/O control included. ADLINK MotionCreatorPro 2 for Microsoft® Windows allows complete EtherCAT motion and I/O configuration and function evaluation as well as compiling program download functions.

- **EU Series EtherCAT Slave System and Modules**

  Modules with state-of-the-art modular construction suitable for small local applications and expansive distributed platforms. The EU system incorporates and controls nearly any type of I/O device. Operates from 0°C to 55°C and is fully compliant with the EN 61131-2 standard for shock and vibration and EN 61000-6 for heavy industrial EMC protection, as well as emission certificate.

- **Nu-Step Driver**

  An EtherCAT stepper driver with motion control commands, feedback data and parameters. Combined with the internal setting comparison trigger function, the system can meet various process control requirements and supports up to 250μs cycles. Supports digital input and output for more accurate, safer, and faster process procedures.

ADLINK—The Automation Expert

ADLINK Technology Inc., with years of market-proven expertise in measurement and automation technologies, provides a leading range of industrial automation products empowering motion control, machine vision, data acquisition, I/O control, and intelligent computing platforms. Superior domain know-how and field experience help us meet and exceed customer needs, with a wealth of highly integrated automation solutions enabling real-time I/O and motion control, backed up with reliable one-stop service. ADLINK consistently delivers value by overcoming a wide variety of industrial challenges, with proven platforms optimizing operations, driven by a commitment to long-term sustainability and intelligent manufacturing design.

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