CALIPERSENSOR

Product Information Note

Honeywell Lithium Ion Battery (LIB) Optical Caliper Sensor provides total thickness measurement of the electrode material during the coating and pressing steps, thus helping to control production processes, identify defects, increase efficiency, and maximize quality.

Due to today's evolving energy demands, the Lithium Ion Battery (LIB) manufacturing industry is expanding rapidly around the world. LIB market growth has been driven by the proliferation of electric and hybrid vehicles, as well as the need for distributed energy storage solutions. In addition, product demand is expected to rise across the electronics industry, owing to the continued growth in the use of smartphones and other mobile electronic devices.

The production of Lithium Ion Batteries requires optimized and consistent roll-to-roll electrode manufacturing and the use of active materials. Electrodes are coated on a metal current collector foil in a composite structure of active material, binders, and conductive additives. This process can affects energy density, conductivity, and porosity in the electrode which impacts battery performance.

IMPORTANCE OF ACCURATE MEASUREMENTS

Companies producing LIBs have to adhere to very high quality standards to ensure maximum performance, the utmost safety and the longest battery lifespan. In particular, sheet manufacturers and equipment OEMs require accurate and continuous measurement of the total thickness of electrode material as part of battery production. They must identify electrode material defects to reduce scrap and increase productivity, since the thickness and basis weight of the material coating is directly related to the energy density of the battery.

The coating and pressing sections of the battery manufacturing process include several demanding operations. It is especially important to produce electrode sheets with a high-quality coating on the top and bottom sides of the material. An accurate thickness measurement of the coating can be used to control the calendaring process.

HONEYWELL'S EFFECTIVE SOLUTION

Honeywell has over 20 years of experience producing advanced sensors and controls for the global Lithium Ion Battery market. We deliver proven technology for LIB production, supported by proven expertise and deep knowledge from many reference installations of quality measurement systems for coating lines. More than 600 Honeywell scanners are currently deployed worldwide in coating and battery separator film applications. Our state-of-the-art optical caliper sensor measures total thickness



The Honeywell LIB Optical Caliper Sensor utilizes an innovative technique to measure total thickness on battery electrode material.

FEATURES

- Total thickness measurement capability
- Chromatic confocal displacement sensor technology
- Provides continuous or single-point thickness readings
- Suitable for clean room environments
- Sensor head Temperature controlled and air purged for measurement stability
- Edge-to-edge precision sheet measurement
- Ethernet data acquisition
- 10 mm head gap enables easy product threading
- 7-mm measurement range to cope with line tension fluctuations and measure thicker products
- Automatic standardization ensuring long-term measurement accuracy
- Provides 1-micron accuracy
- Does not require regulatory approvals or radiation shielding.





Continuous measurement of the total thickness of electrode material is a crucial aspect of LIB production.

of electrode material, to identify production defects and increase efficiency. it is a non-nuclear sensor that eliminates the need for regulatory approvals and radiation shielding

With Honeywell's new LIB Optical Caliper Sensor, manufacturers of Lithium Ion Batteries have an effective solution for measuring the total thickness of electrode material at the pressing station, which is key criteria for optimal battery performance.

Unlike other LIB caliper sensor systems, the Honeywell solution utilizes an innovative technique to measure both the top and bottom coats on the electrode material and provide precise data that can be used as a control feedback. total thickness of the electrode material from edge to edge at 0.5 mm bins this precise data can be used to control the process more effectively. Honeywell's approach uses more accurate chromatic confocal displacement sensors vs traditional laser sensors, confocal sensor is less sensitive to sheet roughness, able to deal with coating to foil transitions, and insensitive to dirt.

Honeywell's proprietary sensor technology enables operators to detect and classify defective areas in the electrode material prior to downstream processing. It also offers seamless integration of the measurement platform with advanced controls and a web-based Human-Machine Interface (HMI). We use multiple optical wavelengths as opposed to competitive single mode laser systems to effectively measure thickness regardless of surface roughness, edges or sheet position.

Honeywell's optical caliper sensor provides continuous or single-point measurement of total electrode coating thickness equal to 1-micron accuracy, thus optimizing coating thickness. The sensor's high-precision measurements are key to reducing scrap and increasing battery production yield.

BENEFITS

Honeywell's LIB Optical Caliper Sensor is an advanced, high-accuracy solution for measuring the total thickness of electrode material in LIB manufacturing. This solution enables total thickness measurements of LIB electrode material during the coating/pressing process with an accuracy of 1micron, thus helping to identify production defects and increase efficiency.

With the addition of the LIB Optical Caliper Sensor to its family of gauging products, Honeywell can provide a complete, integrated solution for end users and equipment OEMs in the Lithium Ion Battery manufacturing industry. Based on decades of experience in LIB production, we deliver patented thickness measurement Honeywell's LIB optical caliper sensor solution enables true thickness measurements of electrode material, helping to identify production defects and increase efficiency.

technology that can improve manufacturing efficiency reduce waste and increase overall performance.

Furthermore, Honeywell's IIoT-ready LIB Optical Caliper Sensor system is easy to integrate with our enterprise capabilities and can be paired with the MasterLogic Programmable Logic Controller (PLC), QCS 4.0 remote monitoring solution, Quality Optimizer production traceabilty and third-party Distributed Control Systems (DCSs). The solution also benefits from Honeywell's global project execution capability coupled with local service and support.

COMPLETE TECHNICAL SUPPORT

Honeywell measurement and control solutions come with worldwide, premium support services. These services encompass the total product lifecycle and are designed to help customers improve and extend the usage of their solutions and the benefits they deliver, ultimately maintaining and safeguarding their performance and reliability.

Honeywell provides a complete portfolio of service offerings to extend the life of plant assets and ensure a cost-effective path forward to the latest technology.

For More Information

To learn more about how Honeywell's LIB Optical Caliper Sensor improves performance, visit <u>hwll.co/sheetmanufacturing</u> or contact your Honeywell account manager, distributor or system integrator.

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