

Re-energising European battery cell production

ARTIFICIAL INTELLIGENCE (AI) AND ROBOTICS CAN PLAY A KEY ROLE IN POWERING UP THE INDUSTRY, SAYS HENRY CLAUSSNITZER, BUSINESS ENGAGEMENT MANAGER, OMRON EUROPE

What can European automotive companies do to future-proof their production lines, especially in relation to battery manufacturing? Robotics, automated quality control and artificial intelligence (AI) can help companies to tackle the strong competition they are facing from Asia.

Some of the key current trends in the European automotive industry include e-mobility, alternative drive types and sustainable transportation strategies. Some 14 million people are employed in and around this automotive sector. Another four million jobs are closely linked to other e-mobility applications used in buses, trams, ships, mining equipment, trucks, agricultural machinery, forklifts and many other areas. Many entrepreneurs, managers and politicians are faced with the question of whether the industry and the European economy are too dependent on imported technologies such as battery cells.

Against this background, the European battery industry is currently repositioning itself in order to increase its competitiveness and future strength. It is looking for innovative and integrated approaches for future battery production that combine smart robotics, sensors, automated quality control, intralogistics, AI and machine learning. These will provide the best possible method of support for machine operators and employees.

Funding local battery cell production

One of the biggest challenges in battery production comes from fierce competition from Asian companies. As in other sectors, European manufacturers are struggling to keep up with low-cost production as a competitive advantage. In contrast, Asian manufacturers have strategies aimed at the reliable production of large quantities of standardised products and dominate the global production of many important e-mobility products today. China, Japan and South Korea are the largest players in worldwide battery cell production, which is a key technology in e-mobility.

In response, the German Federal Government and the European Union are planning various subsidies to support European battery cell production. For this strategy to succeed, the German government will invest some one billion euros from the energy and climate fund by 2022, and corporations will follow suit. For example, Volkswagen plans to start its own battery cell production in Salzgitter, Lower Saxony, by 2023.

The competitiveness of the European e-mobility industry depends upon its ability to identify and implement new, high-performance technologies and

approaches that enable the cost-effective production of high-quality battery cells and other e-mobility products. An important pillar of such strategies is artificial intelligence (AI). When used properly, it can open up new value creation potential in the highly complex production chains involved in the manufacture and assembly of e-mobility components.

At the same time, AI-based tools paired with robotics, sensors and machine vision technology help manufacturers to gain a better understanding of their processes. They can then use these new findings to optimise processes inside and outside the company. This approach can be combined with other AI-driven tools in logistics and predictive maintenance. This will all help European battery manufacturers to benefit from stronger competitive conditions and cost advantages.

Opening up new markets

But AI can do more than create a level playing field. With the help of AI-based systems and solutions, companies can capture market shares in the 'Blue Ocean' segments (marked by differentiation and low costs) that are currently under-supplied. Instead of operating in highly competitive 'Red Ocean' markets, companies should open up new market opportunities and offer customers new products or services.

The still young area of e-mobility is very suitable for this. By increasing process quality and agility, AI is fuelling the production of very customer-specific, complex and high-quality components for this growth industry. It is also increasingly supporting small and medium-sized businesses that use tailor-made and new manufacturing applications. As a result, they are well positioned and can easily keep up with established names in the industry.

AI offers huge potential benefits for e-mobility. However, these possibilities can't develop their full potential unless they are tested, validated and presented as a credible business case in real factory use. The automotive sector has a rather conservative and 'wait-and-see legacy' approach towards introducing new technologies. But that's not all: the use of AI-based technologies also requires a certain level of trust on the part of the user. The best way to build this trust is to involve users in the design of the AI solution at an early stage.

Within e-mobility, it's possible to integrate the right combination of AI technologies into selected workflows of end-to-end production and assembly. However, some fluctuations can have a negative impact on product quality. AI can offer an additional benefit in the business



case, by responding to the need for the production of highly customer-specific e-mobility components such as battery cells. Ideally, AI will help the user to identify and understand the cause-effect relationships of undesirable deviations that could undermine product quality. At the same time, it will help operators to anticipate an effect on product quality and, if necessary, will even help them to react in real time. Last but not least, production lines for new product formats can be configured more rapidly and effectively. But, as before, the project will stand and fall depending on the acceptance of the employees.

Tips for tomorrow's production line

Assembly lines of the future are a combination of different modules and technologies, linked with intralogistics. Each module is responsible for a specific section of production: from sorting and alignment through to processing (for example coating, filling, cutting, stacking or welding right up to labelling and inspection). The production line can be fixed or movable and can connect processes with conveyors, push carts and automated guided vehicle systems, such as mobile robots. Common fields of application are the assembly of battery cells and material handling.

Competitive strength in battery production requires powerful and closely integrated technology, along with well-informed advice. A holistic and AI-based application will help manufacturers to avoid rejects. An intelligent warehouse system, supported by mobile robotics, can increase process efficiency and reduce unnecessary manual effort. The battery cell quality should be controlled by a production and lifecycle solution that covers all of the stages from manufacture to use and recycling, and is flanked by an in-line inspection system. These are key aspects that should be considered if European battery cell manufacturers want to keep up with, or even overhaul, the competition.

MORE INFORMATION: industrial.omron.co.uk