PRESS RELEASE

6. LSE - Laser Symposium Electromobility 2024: Laser precision - not a luxury, rather a competitive advantage

The sixth Laser Symposium Electromobility (LSE 24), organized by the Fraunhofer Institute for Laser Technology ILT in January 2024, provided impetus for sustainable and economical production of electric vehicles. Seventy participants from industry and research came together to discuss laser-based manufacturing methods, particularly for the production of battery modules and packs. The key message from Aachen: Cleverly applied laser precision is not a luxury, rather a tangible competitive advantage.

"I am delighted that tried-and-tested laser processes such as soldering, cutting and welding dominated among the solutions for battery technology at the LSE this year," explained Dr. Alexander Olowinsky, Head of Joining and Cutting at Fraunhofer ILT. "I am convinced that this advanced laser technology will not only stand up to the competition in terms of precision, but also in terms of cost-effectiveness and sustainability."

Laser cutting improves quality

Bavarian company Sonplas GmbH is proving that precise laser technology is not a luxury, but can provide long-term competitive advantages. The specialist for combustion engines has been manufacturing systems for the production of battery cells since 2020. By using advanced laser processes, the Bavarians can improve the quality of battery cells and reduce the reject rates that conventional production methods suffer from. Precise laser cutting overcomes effects such as delamination and burr formation, which commonly occur in mechanical cutting processes.

Product Manager Luca Schmerbeck explains: "The use of laser technology in battery cell production offers our customers decisive advantages. It not only reduces tool downtime and costs, but also significantly increases battery performance." According to Schmerbeck, the company's research results confirm that laser-cut electrodes increase battery power.

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High-tech in battery production: assembling and laser soldering with precision

Wolf Produktionssysteme GmbH & Co. KG showed how they achieve precision and cost efficiency with advanced technology. The specialist for special machines has developed systems for welding battery contacts made of aluminum and copper. The challenge was great, as material thicknesses of just 0.2 to 0.4 millimeters had to be joined without damaging the cells. Head of Development Nico Reinheimer says: “We apply a tumbling process that enables us to precisely control the welding depth and prevents blow-through.” Wolf also uses “floating grip” technology: This clamping technology positions aluminum and copper in such a way that a uniformly welded joint is generated.

The company relies on laser soldering to join components. Company owner Dr.-Ing. Ernst Wolf names the typical application: “Laser soldering is gentle on heat-sensitive components as it operates at lower temperatures.” His company has developed this soldering technology into a precise and efficient process. Wolf's precisely controlled laser soldering technology enables it to join heat-sensitive electronic components precisely with less heat, thereby saving energy and increasing the longevity of the products.

No need for wire: welding with the mobile clamp

Heat sensitivity is also a key issue for Hesse GmbH. The leading manufacturer of ultrasonic wire bonders and welding systems is breaking new ground: It deliberately decided against traditional wire handling. Hesse uses a flexible, cylindrical clamping device in the SmartWelder, an ultrasonic welding system with an output of 1.5 kilowatts. Development engineer Dr. Lars Helmich clarifies: “There are various approaches to clamping your modules. Instead of a fixed clamp, we use a mobile clamp that moves from one connection to another. Thanks to its stable structure, this system enables us to work precisely even at high capacities.”

The workshops and presentations at LSE 24 showed the many ways in which lasers can optimize battery production. The use of modern technologies, such as AI and real-time measurements, significantly improves efficiency, quality and scalability. Dr. Alexander Olowinsky summarized: “I am always amazed at how medium-sized companies are contributing to the mobility transition by developing innovative production methods. Their advancements in laser technology not only strengthen efficiency and sustainability in battery production, but also Germany's position in global competition.”

Image 1:
Luca Schmerbeck, Sonplas: "The use of laser technology in battery cell production reduces tool downtime and costs, and improves battery performance."
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Image 2:
Dr. Ernst Wolf, Wolf Produktionssysteme: "Laser soldering is gentle on heat-sensitive components as it operates at lower temperatures."
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Image 3:
Dr. Lars Helmich, Hesse: "Instead of a fixed clamp, we use a mobile clamp that moves from one connection to another."
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Image 4:
Dr. Alexander Olowinsky, Fraunhofer ILT: "Advanced laser technology not only stands up to the competition in terms of precision, but also in terms of cost-effectiveness and sustainability."
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