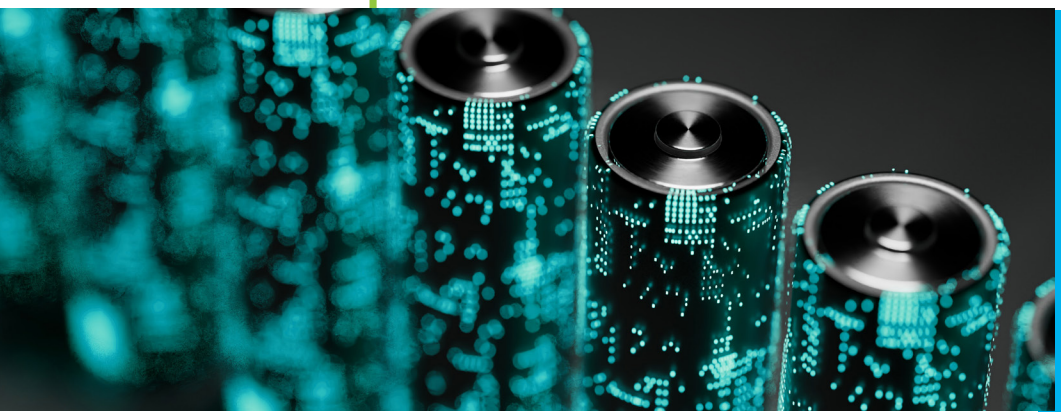
Advanced Laser Automation for Delicate Material Processing

SUCCESS STORY

Loading, cutting, cleaning and inspection



SECTOR
EV Industry

OBJECTIVE

Obtain a clean precision cut on a fragile and critical “layer” in automation.

Background

The battery manufacturing startup company found itself at a crucial stage in their go-to-market journey. They urgently needed to scale up their manufacturing volume to meet the growing demands of their customers, which was vital for their success.

The customer’s process team had conducted internal research and development in a laboratory and R&D setting, specifically focusing on laser cutting a key layer in their unique battery stack. However, the challenge they now faced was introducing this technology into a high-volume automated environment. Moreover, they recognized the importance of optimizing the process to ensure the highest quality standards and improve overall throughput.

Challenges

The battery manufacturing process presented several challenges related to the delicate nature of the battery material. Handling the material proved particularly difficult due to its thin and brittle composition, making it susceptible to damage. When it came to processing, standard die cutting technologies were inadequate, and conventional laser cutters caused undesirable effects such as thermal damage, micro-cracks, and sticky debris, all of which could have severe consequences during battery assembly.

Adding to the complexity, the early-stage nature of the product technology meant that the battery’s form factors were subject to change, introducing further obstacles for both the process and the equipment involved. These evolving form factors required adaptability to accommodate potential modifications at any given moment.

Customer’s Needs

The laser process required meticulous optimization to ensure impeccable cutting quality, characterized by clean and precise kerf, minimal heat-affected-zone, and the absence of micro-cracks. Simultaneously, the processes had to be efficiently executed to achieve high throughput manufacturing in line with the desired production targets. It was imperative to develop automated cleaning mechanisms capable of handling the debris generated by the process while maintaining matching throughput.

To meet the dynamic needs of the manufacturing operation, the process and equipment had to be versatile and modular. This was crucial to accommodate various form factors, which were likely to change over time. Additionally, the cleaning process had to effectively remove debris generated during cutting at the same throughput of the rest of the manufacturing equipment. The delicate and fragile layers required swift and reliable movement throughout the tool to ensure seamless operations.

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Why It's Critical

Meeting these requirements was paramount to the battery company's go-to-market strategy. Failure to meet the quality standards would result in lower yields or subpar battery performance, and in the worst case, even lead to catastrophic battery failures. Considering the highly competitive market landscape, establishing a reputation for delivering high-quality products was essential for the success of this new offering.

Simultaneously, achieving optimal throughput was a crucial factor in determining the cost of the batteries and the ability to meet production volume targets. Falling short of these targets could instill doubt in the market regarding the scalability of the technology, leading to hesitancy in adopting the product. Therefore, balancing both quality and throughput was vital in ensuring customer confidence, market adoption, and the overall success of the battery company in a fiercely competitive market.

Our Solution

Turner Laser Systems and Owens Design partnered together to develop and incorporate a manufacturing-ready process into a production ready laser system. This semi-custom laser platform was integrated quickly into a custom, fully automated system to handle and clean the delicate parts. The laser expertise of Turner Laser Systems and the manufacturing equipment experience of Owens Design delivered a complete solution to guarantee both the process and the automation worked together out of the box.

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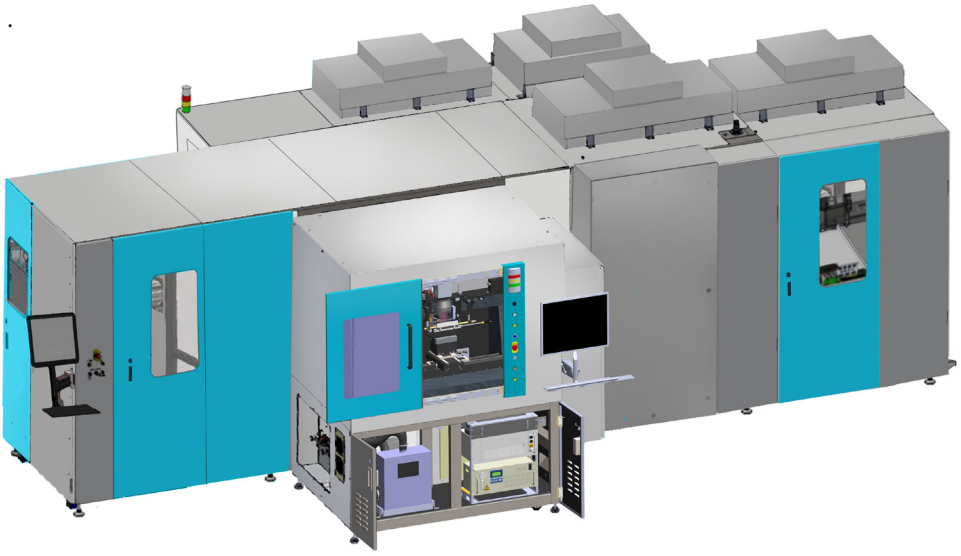

Machine rendering has been altered to protect customer's IP.

Curious about how the 360 Mastery Methodology can help? Feel free to contact us for more information on the availability of a comprehensive case study:

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