



Case Study

UL Helps Sunlight Group Demonstrate Functional Safety of Lithium Batteries



Sunlight Group Energy Storage Systems



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Defining functional safety in today's systems

Learn how Sunlight Group Energy Storage Systems worked with UL to fulfill the functional safety requirements for end-product certification.

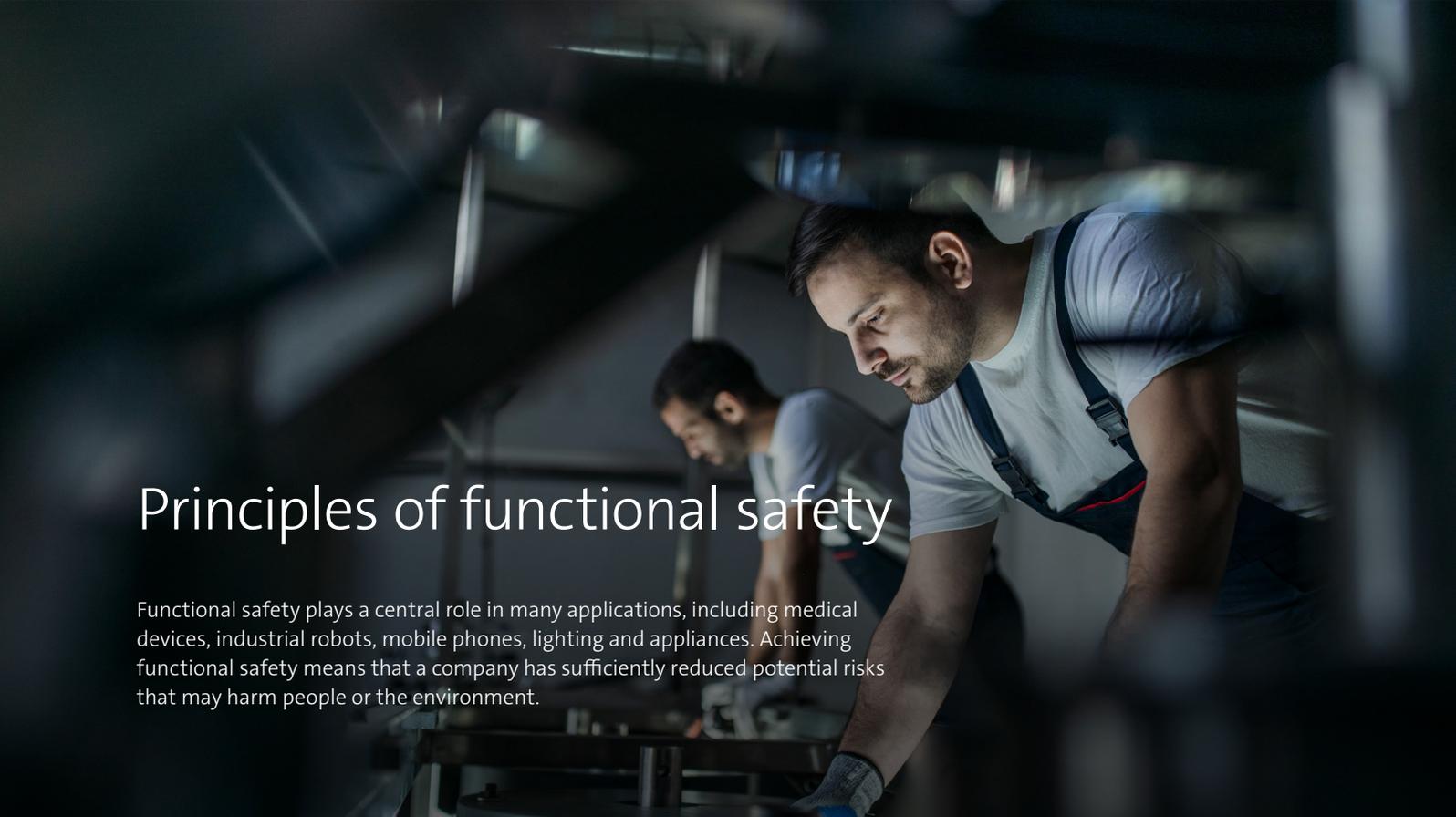
For more than 30 years, Sunlight Group Energy Storage Systems (Sunlight Group) has produced lead-acid batteries for various types of industrial applications and energy storage systems. However, as customer demand for lithium-ion batteries increased, Sunlight Group added lithium manufacturing capabilities to its Xanthi, Greece plant in 2017. Sunlight Group released its first commercial lithium-ion battery line, Li.ON FORCE, to the market in 2018.

The initial market success of Li.ON FORCE led to Sunlight Group's plan to add lithium capabilities to its U.S. battery assembly plant in Greensboro, North Carolina. Once fully operational, Sunlight Group would be able to assemble and ship orders to North American customers within a 72-hour timeframe — a considerable improvement over the two months it took to deliver Li.ON FORCE batteries shipped from the company's battery assembly plant in Greece.

Because lithium is a highly reactive substance and lithium-ion battery incidents have made news headlines over the years, Sunlight Group wanted its lithium batteries independently tested before finalizing the product offering in North America. Sunlight Group turned to UL, a leader in battery technology safety testing and certification, to confirm that its lithium batteries fulfilled all requirements according to the functional safety code and the designated end product's certification standard.

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Principles of functional safety

Functional safety plays a central role in many applications, including medical devices, industrial robots, mobile phones, lighting and appliances. Achieving functional safety means that a company has sufficiently reduced potential risks that may harm people or the environment.

Consequently, functional safety assessments differ entirely from end-product testing because the former involves reviewing each stage of the product life cycle and evaluating the product's complete set of safety requirements.

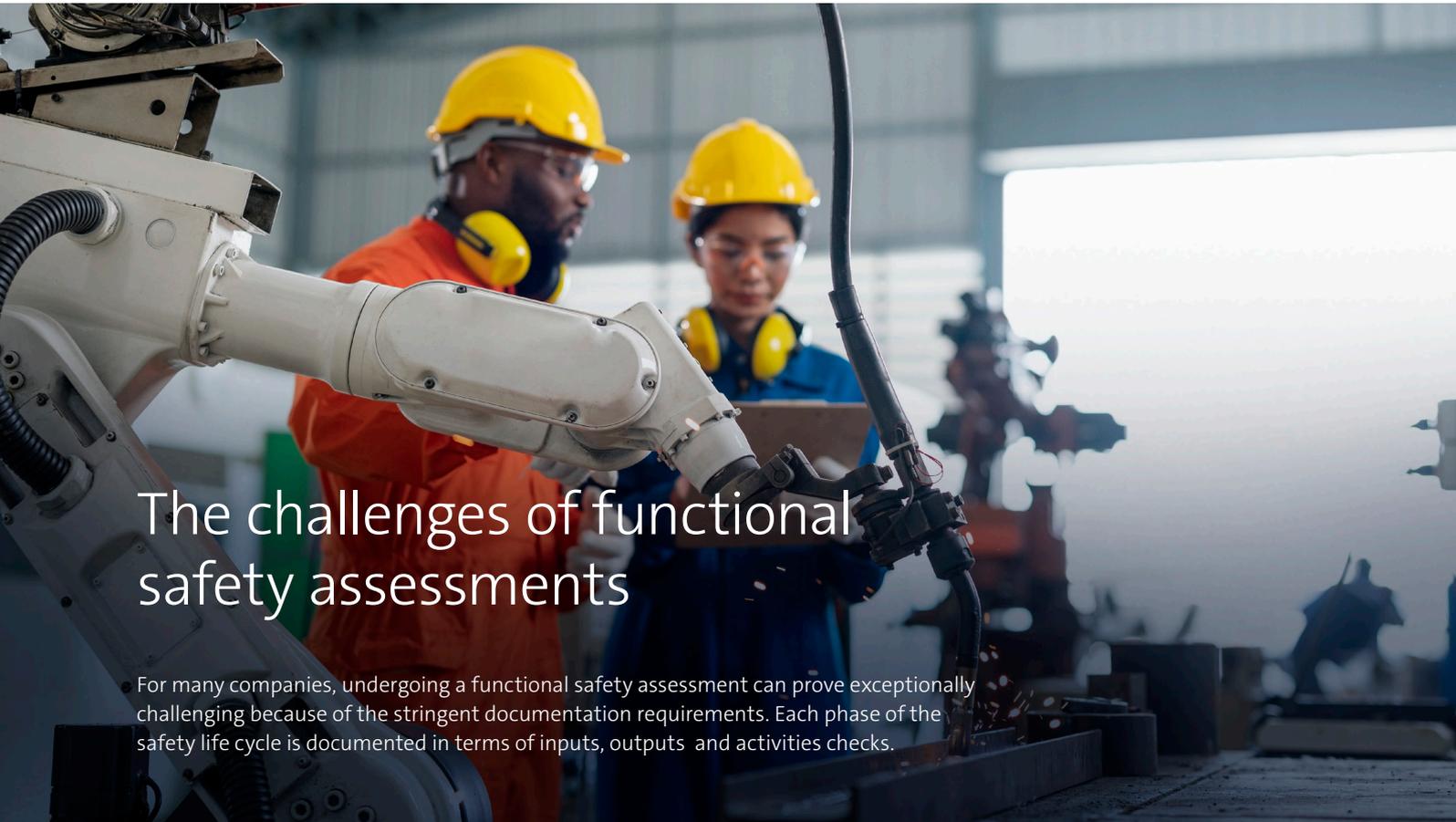
"The functional safety assessment is all about the process and is, therefore, an audit of the established processes and procedures for a product," said Bashier Machmur, UL's head of functional safety for Europe, the Middle East and Africa.

Machmur, who has a doctorate in functional safety from the University of Kassel in Germany, added that companies that undergo a functional safety assessment need to show that they have developed a comprehensive functional safety process and followed the steps documented during product development.

Many end-product standards require functional safety, such as UL 583, the Standard for Electric-Battery-Powered Industrial Trucks, the Standard to which Li.ON FORCE earned certification. For the Sunlight Group project, the product also had to meet requirements for UL 2580, the Standard for Batteries for Use in Electric Vehicles. UL 2580 requires a battery management system to maintain the specified voltage, temperature and current operating range. It also evaluates the software controls for risks associated with systematic faults due to software defects and random faults from microelectronics failures.

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- Bashier Machmur



The challenges of functional safety assessments

For many companies, undergoing a functional safety assessment can prove exceptionally challenging because of the stringent documentation requirements. Each phase of the safety life cycle is documented in terms of inputs, outputs and activities checks.

“We had to ensure that the electronics hardware design and embedded software were developed according to the UL Standards,” said Vaggelis Dinolazos, testing and certifications manager at Sunlight Group. “Designing and developing products according to UL Standards is key and tremendously accelerated the certification process, and that is exactly what we always aim for at Sunlight Group.”

Before launching the project, UL met with Sunlight Group to help prepare them for the assessment by describing the process and detailing the functional safety standards. Machmur’s team provided a lot of training and engineering support to educate them on functional safety.

Upon project launch, Sunlight Group delivered all the documentation to Machmur, who reviewed the product’s safety framework. After completing the documentation review, Machmur sent Dinolazos a list outlining safety gaps. Finally, Machmur witnessed the hardware and software testing before completing his report.

“UL certification of our battery product portfolio is very important to us. Our goal is to offer our customers a full certified range of batteries,” said Georgia Stavropoulou, senior marketing manager for Sunlight Group. “This is unique among our competition, as the norm is to certify only one battery and then claim they have certified the full range. We will continue working with UL to test and certify all our battery systems.”



Defining functional safety in today’s systems

Functional safety is about reducing the risks of simple and complex systems such that they function safely in the event of an electrical or electronic malfunction. As more products incorporate complex microelectronics and software into their design, it is becoming increasingly challenging for quality and safety engineers to assess and implement functional safety at the system level.



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