

Press release

LHDismantle: Automated disassembly of high-voltage batteries

– Efficient solutions for sustainable battery recycling and the circular economy

Electric mobility is on the rise – and with it, the need for efficient solutions for the recycling and reprocessing of high-voltage batteries. Liebherr-Verzahntechnik GmbH has developed LHDismantle, an industrial-grade system for the automated disassembly of high-voltage batteries. At IFAT, the world’s leading trade fair for water, wastewater, waste and raw materials management in Munich, the company will be presenting solutions ranging from automated unscrewing processes to modular and scalable turnkey systems for disassembly and unloading from May 4 to 7, 2026.

Munich (Germany), May 4, 2026 – OEMs and recycling companies face a common challenge: Regardless of whether battery components are reconditioned for reuse or sent for recycling, the first necessary step in the process is to dismantle the high-voltage batteries from electric vehicles. However, dismantling them manually is time-consuming, costly and involves safety risks. At the same time, the volume of returns is rising steadily, and there is a shortage of qualified personnel capable of handling high-voltage components.

There is another reason why early, smart and automated disassembly is a key component of a functioning battery recycling system: Once the material has been shredded, valuable materials such as copper, nickel, cobalt, manganese and lithium can usually only be recovered through complex metallurgical processes. Leading recycling companies are therefore increasingly relying on precise disassembly processes to achieve high recovery rates and high material quality. This is exactly where LHDismantle comes in.

From research to industrial application

Based on the results of the “ZIRKEL” research project, funded by the BMBF, which investigated the circular economy of battery systems in the electric mobility sector as part of an interdisciplinary consortium, Liebherr-Verzahntechnik GmbH has developed LHDismantle, an innovative disassembly cell for industrial use. The system automates the non-destructive loosening of numerous bolted joints – a safety-critical process that has predominantly been carried out manually until now. The battery management system (BMS) can only be deactivated after opening the battery compartment; this creates safety risks due to the exposed high-voltage contacts. LHDismantle automates this stage of the process, reduces the exposure of specialist staff to high-voltage hazards and lays the groundwork for safe, repeatable further processing.

Technical challenges

Automating battery disassembly is a challenging task: Different battery types require a high degree of flexibility, as their geometries, screw types and positions vary considerably. Contamination, corrosion and damage make it difficult to reliably detect the screws, which is particularly challenging for camera-based systems. There is also the high voltage hazard, which imposes the strictest requirements on workplace safety.

LHDismantle: Automated unscrewing

At its core, LHDismantle uses a patented, tactile unscrewing method with automatic position correction. This makes the system resistant to dirt, corrosion and damage, and ensures maximum process reliability. It also achieves high productivity. An automatic tool change system allows different types of screws to be machined without manual intervention. The removed screws are safely taken away via a swivel unit or an optional extraction module.

The system is operated via an intuitive user interface that displays a live graphical status of the entire unscrewing process. Battery types and unscrewing programs are selected directly from an integrated database; new component types can be set up quickly, both in terms of programming and tooling. Using a digital twin, Liebherr-Verzahntechnik GmbH can digitise new battery variants in advance and simulate and validate the disassembly process before the relevant programs are made available to system users. "When we need to process a previously unknown battery pack, we use reverse engineering to create a virtual twin of the battery pack. From this, we derive the tools and the appropriate disassembly sequence," explains Viktor Bayrhof, Product Manager for Automation Systems. This shortens ramp-up times and reduces risks when processing new battery variants.

Turnkey solutions: Integration into the process chain

In addition to unscrewing technology, Liebherr-Verzahntechnik GmbH offers a comprehensive portfolio of solutions for the handling, transport, and storage of high-voltage batteries. The LHDismantle cell integrates seamlessly into modular automation systems, serving as a central component within an end-to-end process chain. Pallet handling systems (PHS) connect automation cells, machines, and manual workstations. In addition, unloading equipment and manual workstations are used for subsequent steps. Third-party components, such as machining centres for milling or laser cutting processes, can also be flexibly integrated. "We always consider the system as part of the overall setup and seamlessly integrate external process steps as needed," says Viktor Bayrhof. This results in a comprehensive, scalable solution for the safe and efficient processing of high-voltage batteries.

Win-win: Practical testing in real life conditions

The disassembly cell can be viewed at the Liebherr-Verzahntechnik GmbH Tech Centre in Kempten. The company is currently preparing to deploy the system at a test site. The concept is based on mutual benefit: Recycling companies gain access to industrial automation technology and can trial it in real life operating conditions. In turn, Liebherr-Verzahntechnik GmbH gains valuable insights from its practical application and is able to continuously refine the system. "Our solution offers a risk-free introduction to

automated disassembly, particularly for companies that have had little experience with automation to date,” explains Viktor Bayrhof.

Positioning in a growing market

With LHDismantle, Liebherr-Verzahntechnik GmbH is addressing the growing demand for industrially scalable solutions for battery disassembly. When combined with the corresponding turnkey systems, this creates a comprehensive, integrated solution that adapts flexibly to growing production volumes and supports an efficient circular economy in the field of electric mobility.

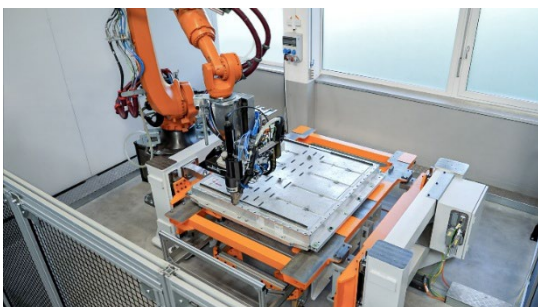
About the „Liebherr-Verzahntechnik GmbH“

Liebherr develops and produces high-quality gear cutting machines, gear measuring machines, gear cutting tools and automation systems. The range includes gear hobbing, gear shaping, gear skiving, generating and profile grinding machines as well as chamfering and deburring machines. The measuring devices with software developed in-house stand for ergonomics, user-friendliness, precision, robustness, durability and service-friendliness. Liebherr is also one of the world's leading manufacturers of gear cutting tools and stock tools with long service life. The range of automation systems ranges from linear robots and robot applications to conveying and storage systems through to solutions for pallet handling systems.

About the Liebherr Group

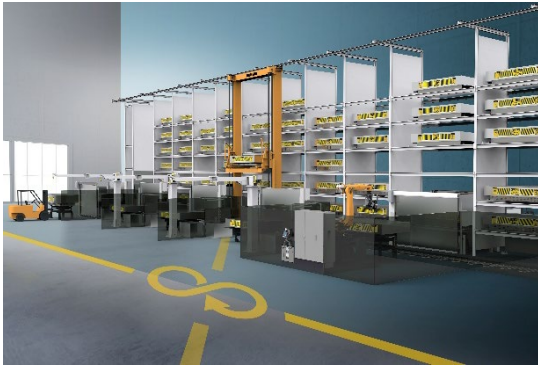
The Liebherr Group is a family-run technology company with a highly diversified product programme. The company is one of the largest construction equipment manufacturers in the world. It also provides high-quality, user-oriented products and services in a wide range of other areas. The Liebherr Group includes over 150 companies across all continents. In 2025, it employed more than 55,000 staff and achieved combined revenues of over 14 billion euros. Liebherr was founded by Hans Liebherr in 1949 in the southern German town of Kirchdorf an der Iller. Since then, the employees have been pursuing the goal of achieving continuous technological innovation, and bringing industry-leading solutions to its customers.

Images



liebherr-lhdismantle.jpg

LHDismantle – automated disassembly of non-destructive high-voltage batteries.



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Turnkey Systems – modular scalable systems for automated disassembly and unloading of high-voltage batteries.

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