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# Automation solution from Bosch Rexroth industrializes deep discharging for battery recycling

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- Patented process for the reliable deep discharging of electric vehicle batteries
- Core process now 100 times faster
- Modular structure allows quick scaling to higher volumes



At HANNOVER MESSE 2023, Bosch Rexroth will present the first industrial automation solution for the success-critical step of deep discharging high-performance battery cells. (Image source: Bosch)

Sales of electric vehicles are increasing sharply throughout the world. The recycling of high-performance batteries to recover the valuable chemical components as part of a sustainable circular economy is thus a key issue. At HANNOVER MESSE 2023, Bosch Rexroth will present the first industrial automation solution for the success-critical step of deep discharging. Thanks to the new system, a process that used to take 24 hours now takes less than 15 minutes.

Electrified mobility is gaining ground, with sales of electric vehicles increasing throughout the world. According to market observers such as EV Volumes from Sweden, more than ten million electric vehicles were registered worldwide in 2022 alone. Governments and companies are already planning a sustainable circular economy in order to recover the scarce raw materials for batteries such as lithium or nickel. By recycling the batteries, up to 95 percent of the chemical elements can be fed back into the battery production process. With a complete automation solution for the deep discharging of batteries, Bosch Rexroth offers an introduction to industrial recycling with potential for rapid scaling.

### Process now 100 times faster

As part of a process patented by Bosch Rexroth, the automation solution takes over the innovative deep discharging of the high-performance battery cells prior to subsequent process steps. Only fully discharged batteries can be safely shredded and then broken down into their chemical components.

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The TS 5 transfer system from Bosch Rexroth transports battery cells of different sizes and types from various manufacturers between the diagnostic discharging and dismantling stations. After contacting, a modular solution from the automation toolkit ctrlX AUTOMATION toolkit with the control platform ctrlX CORE and the drive system ctrlX DRIVE discharges the battery cells in the discharging station. The discharging equipment automates the initial inspection, the patented deep discharging process with chemical inactivation and the final check. Compared to the previous manual discharging process which took 24 hours, the automated process takes less than 15 minutes and is thus 100 times faster than before. At the same time, it offers optimum protection for workers and significantly reduces the fire risk later on.

### **Flexible and largely maintenance-free: The TS 5 transfer system**

The TS 5 transfer system for heavy loads meets all the requirements of recycling lines as a roller conveyor system. A variety of different modules opens up a high degree of freedom for the targeted transfer of battery cells in any layout. Compared to systems with a normal chain drive, the TS 5's king shaft drive and conveyor rollers allow a virtually maintenance-free production process with low wear. The transfer system fits seamlessly into the ctrlX AUTOMATION control architecture and offers a full range of options for connecting to i4.0 tools, for example to visualize production processes in real time.

### **Complete solution made up of modular hardware and software**

The compact ctrlX CORE, which is based on modern app technology, controls the transfer and the deep discharging process. For the discharging process, the developers at Bosch Rexroth have integrated all functions such as switchover management. Bosch Rexroth also uses apps that are already being used in the final tests at various battery manufacturers. Users can collect all process data via the ctrlX CORE's ctrlX Data Layer and save these data for quality assurance purposes.

The ctrlX DRIVE takes the energy from the discharging process. Via an integrated AC and DC converter, the energy is fed either into an intermediate circuit, which supplies other loads in the line in an energy-saving manner, or back into the public electricity grid. The discharging station thus reduces the external power requirements of the entire recycling facility and reduces CO2 emissions.

### **Easily scalable**

The combination of TS 5 and ctrlX AUTOMATION offers great flexibility for users. The modular structure of the automation solution allows very economical scaling to higher volumes in the future as well as adaptation to new battery cell types with higher power ratings. Bosch Rexroth relies on open standards for communication and programming throughout. As a result, the solution fits very easily into users' IT structures.

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As part of a patented process, an automation solution from Bosch Rexroth takes over the innovative deep discharging of high-performance battery cells. (Image source: Bosch)



The compact ctrlX CORE, which is based on modern app technology, controls the transfer and the deep discharging process. (Image source: Bosch)



By recycling the batteries, up to 95 percent of the chemical elements can be fed back into the battery production process. (Image source: Bosch)

### Basic Information Bosch Rexroth

As one of the world's leading suppliers of drive and control technologies, Bosch Rexroth ensures efficient, powerful and safe movement in machines and systems of any size. The company bundles global application experience in the market segments of Mobile and Industrial Applications as well as Factory Automation. With its intelligent components, customized system

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solutions, engineering and services, Bosch Rexroth is creating the necessary environment for fully connected applications. Bosch Rexroth offers its customers hydraulics, electric drive and control technology, gear technology and linear motion and assembly technology, including software and interfaces to the Internet of Things. With locations in over 80 countries more than 32,000 associates generated sales revenue of around 7.0 billion euros in 2022.

### Basic Information Bosch

The Bosch Group is a leading global supplier of technology and services. It employs roughly 420,000 associates worldwide (as of December 31, 2022). According to preliminary figures, the company generated sales of 88.4 billion euros in 2022. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. As a leading IoT provider, Bosch offers innovative solutions for smart homes, Industry 4.0, and connected mobility. Bosch is pursuing a vision of mobility that is sustainable, safe, and exciting. It uses its expertise in sensor technology, software, and services, as well as its own IoT cloud, to offer its customers connected, cross-domain solutions from a single source. The Bosch Group's strategic objective is to facilitate connected living with products and solutions that either contain artificial intelligence (AI) or have been developed or manufactured with its help. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life." The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiary and regional companies in some 60 countries. Including sales and service partners, Bosch's global manufacturing, engineering, and sales network covers nearly every country in the world. With its more than 400 locations worldwide, the Bosch Group has been carbon neutral since the first quarter of 2020. The basis for the company's future growth is its innovative strength. At 128 locations across the globe, Bosch employs some 85,000 associates in research and development, of which nearly 44,000 are software engineers.

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