

Disassembly of the energy storage lithium battery pack

Why are lithium ion batteries so difficult to disassemble?

The disassembly of lithium-ion battery systems from automotive applications is complex and time-consuming due to varying battery designs, flexible components, and safety hazards associated with high voltage and chemicals.

Can a battery pack be disassembled?

Current battery packs are not designed to be disassembled, spaces between modules are narrow, and joint technologies are mostly irreversible (e.g., glued parts, welded plates, one-way screws), bringing to a difficult non-destructive disassembly.

Can a robotic cell disassemble a battery pack?

The analysis highlights that a complete automatic disassembly remains difficult, while human-robot collaborative disassembly guarantees high flexibility and productivity. The paper introduces guidelines for designing a robotic cell to disassemble a battery pack with the support of an operator.

Can robots disassemble lithium ion batteries?

In the specific context of lithium-ion battery (LIB) pack disassembly, research has demonstrated that human-robot collaboration is the most effective approach. Robots can efficiently cut the battery pack, while technicians can quickly sort battery components and handle connectors or fasteners that might be challenging for robots.

What happens if a Lib battery is disassembled?

As reported in , even using modules with a limited residual charge, thermal runaway, with gas emission, is possible in case of short circuits that can easily happen during the disassembly. The gas mixture released from LiB can create an ATEX zone around the battery pack.

How much does it cost to disassemble a battery pack?

The total cost per pack disassembly into modules ranges from EUR 80 to 110, depending on the size of the disassembly plants, in Germany. Rallo et al. considered the laboratory scale and determined a total cost of EUR 1325 to disassemble the Smart ForFour battery pack into cells.

The regarded parameters can be divided into five categories: o o o o o Identification of the individual battery pack General information about the battery pack (including discharging information) ...

4 ???· Lithium batteries represent a significant energy storage technology, with a wide range of applications in electronic products and emerging energy sectors. ... including disassembly, ...

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2.2.1 Battery disassembly. The first step of battery disassembly is to remove the battery pack from the EV, which requires the use of a trailer to lift the drive wheels of the ...

The battery pack used in Figure 3 is typical of that found in many other battery-operated devices. It consists of several battery cells connected in series plus a Battery Management System (BMS) PCB. This is the circuit ...

Disassembly of the entire battery pack is a significantly complex process. There are several methods for planning an optimal disassembly sequence for obsolete LIBs. Most approaches implement a case study with ...

This paper discusses the future possibility of echelon utilization and disassembly in retired EV battery recycling from disassembly optimization and human-robot collaboration, facing uncertain disassembly and echelon ...

The rapidly growing deployment of Electric Vehicles (EV) put strong demands on the development of Lithium-Ion Batteries (LIBs) but also into its dismantling process, a necessary step for circular economy. The aim of this ...

This paper analyses the use of robotics for EVs" battery pack disassembly to enable the extraction of the battery modules preserving their integrity for further reuse or recycling. The analysis highlights that a complete ...

Rapid advances in the use of lithium-ion batteries (LIBs) in consumer electronics, electric vehicles, and electric grid storage have led to a large number of end-of-life (EOL) LIBs awaiting recycling to reclaim critical ...

Energy Storage 2020, 31, 101739 ... Edge, J.S.; Offer, G.J. Breaking it down: A techno-economic assessment of the impact of battery pack design on disassembly costs. Appl. Energy 2023, 331, 120437 ... Liu, W.; Li, ...

Battery Cells (e.g., 18650 lithium-ion cells); Cell Holder (to securely position the battery cells); Nickel Strips (for connecting battery cells in series or parallel); Insulation Bar (to prevent short ...

o The difference in disassembly cost between battery pack designs varies up to 75% o Reducing the number of modules and fasteners reduces the battery disassembly cost. o Automated ...

Most primary lithium cells have a warning printed on the label that cautions against the following conditions: - Short-circuit - Charging - Forced over-discharge - Excessive heat or incineration - ...

It can be found that the temperature profile of battery pack and plane section of battery cells at overspeed operational condition is also similar to that at high-speed climbing ...

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