

How to design a battery disassembly system?

The design of the disassembly system must consider the analysis of potentially explosive atmospheres (ATEX) 1 of the area around the battery pack and, if necessary, adopt tools enabled to work in the corresponding ATEX zone.

Is the void of battery design regulation a challenge to automatic disassembly?

It is well known that the current void of battery design regulation created a heterogeneous ensemble of design solutions that represent a challenge to automatic disassembly . New EU battery regulation defines requirements on sustainability, safety, labelling and information on the batteries marketed and put on service in the EU.

Are robot-based flexible disassembly systems suitable for Li-ion batteries and supplementary electric motors? Conventional automated disassembly systems provide limited flexibility and adaptability for the disassembly of these products. Within this contribution two robot-based flexible disassembly systems are systematically derived for Li-ion battery modules and supplementary electric motors.

How difficult is it to automate battery disassembly?

However, the current lack of standardisation in design remains a significant barrier to automating battery disassembly . Additionally, the uncertain conditions of end-of-life or damaged EVBs add to the complexity of executing the disassembly process effectively.

Are battery pack designs a key obstacle to automated disassembly?

As identified in various studies,a key obstacle is the significant variation in battery pack designs,which complicates the automation process . Thompson et al. highlighted that the diversity in battery pack designs,along with the use of various fixtures and adhesives,impedes automated disassembly.

How can automated disassembly be introduced in the future?

Once the production of batteries has increased,automated disassembly can be introduced in the future. For this to be possible,it is important to consider the design of the battery and to make sure it has a minimized amount of materials and parts,in addition to suitable joining techniques.

The paper introduces guidelines for designing a robotic cell to disassemble a battery pack in collaboration with an operator. The design of the workcell evaluates the technological requirements...

The material with h (thickness) is bent with a (γ) yield strain; beyond this point, the material twists plastically and cannot be recovered.The yield strain and bending radius of flexible devices and materials are also important factors. The designed materials must operate in the elastic area to maintain long-term flexibility

and battery performance during operations, ...

As a definition for this paper, semi-destructive disassembly technologies aim to separate components of a EVB by destroying connecting elements such as screws or ...

Hence, this contribution presents the challenges of disassembly automation in the special context of lithium ion battery technology in general. Furthermore, a flexible gripper system is presented in detail to show how the disassembly process can be ...

Design for disassembly is a crucial principle enabling closed-loop systems where subcomponents can be disassembled, reused, or recycled. The authors emphasize the importance of disassembling battery subcomponents and suggest solutions for interfaces that prioritize easy disassembly and non-destructive separation. The paper proposes delaying the ...

Meanwhile, related comprehensive analysis is introduced to delve into the fundamental design principles pertaining to electrodes, electrolytes, current collectors, and integrated structures for various flexible batteries. Finally, the developments and challenges of flexible batteries are summarized, offering viable guidelines to promote the practical ...

Based on the evaluation, an "ideal" battery is developed with focus on the hardware, hence the housing, attachment of modules and wires, thermal system and battery management box. An ...

The rapid expansion of the global electric vehicle industry has presented significant challenges in the management of end-of-life power batteries. Retired power batteries contain valuable resources, such as lithium, ...

Based on the evaluation, an "ideal" battery is developed with focus on the hardware, hence the housing, attachment of modules and wires, thermal system and battery management box. An assessment is made of the application of these high voltage batteries in Volvo and how design for second life should be considered.

This chapter presents the implementation of human robot collaboration for disassembly of lithium-ion Batteries and shows how an intuitive programming environment, which does not require experience in robot programming, is combined with cost efficient tooling and additional 3D safety sensors to realize a safe, productive and ergonomic workspace. The rising number of electric ...

Flexible approaches to automated disassembly are required for cost-effective battery recycling. MTC developed a vision system and task planner to demonstrate machine ...

Zhang et al. [30] proposed a knowledge-based flexible human-machine hybrid disassembly method to achieve high-precision disassembly of power battery screws. Wegener et al. [31] introduced the idea of a battery

disassembly workstation where a robot does straightforward and repetitive activities while a human executes more flexible and difficult ...

With the growing requirements of retired electric vehicles (EVs), the recycling of EV batteries is being paid more and more attention to regarding its disassembly and echelon utilization to reach highly efficient resource utilization and environmental protection. In order to make full use of the retired EV batteries, we here discuss various possible application methods ...

Conventional automated disassembly systems provide limited flexibility and adaptability for the disassembly of these products. Within this contribution two robot-based flexible disassembly systems are systematically derived for Li-ion ...

Li-ion batteries are the key enabling technology in portable electronics applications, and such batteries are also getting a foothold in mobile platforms and stationary energy storage technologies ...

This novel approach demonstrates flexibility in complex disassembly tasks, systematically optimising HRCD for battery recycling and enhancing decision-making and operational efficiency.

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