

Why is structure design important for a battery pack?

Despite the remarkable progress in battery technology, there are still many challenges in optimizing the structure design of battery packs to achieve lighter, safer, and more efficient systems. Lightweight design is particularly important because reducing the overall weight of a vehicle can significantly improve energy efficiency and endurance.

What is the structure at the bottom of a battery pack?

The structure at the bottom of the battery pack typically consists of a shell, insulation material, battery module, support structure, and so on. The response of different battery pack bottom structures to ball strikes can vary. In China, the commonly used conditions for the bottom ball impact test of battery packs are set as follows,

Why is simulation analysis important in battery design?

Simulation analysis of the structural mechanics of battery packs has emerged as an important tool for evaluating the stability and safety of bottom design [9-11]. Figure 1 illustrates how simulation analysis eliminates adverse factors, determines impact effects, and offers optimal design solutions to address potential issues.

Does impact on the bottom affect battery pack performance?

In the analysis of mechanical safety for battery packs, the impact on the bottom has a significant effect on pack performance, especially in the stress concentration area near the point of impact [12,13]. The deformation of the pack mainly occurs in the horizontal or vertical direction.

What is a battery module structure?

Module structure and optimization descriptions The module structure surrounding battery cells should be optimized to maximize cell volume or weight while satisfying mechanical and thermal safety constraints. This section presents the basic module structure used in this study and summarizes the optimization process.

How does impact angle affect the safety performance of a battery pack?

Furthermore, the impact angle also influences the safety performance of the battery pack. Therefore, conducting a simulation analysis using the bottom ball strike method is crucial for studying the factors and weights that influence the mechanical safety performance of the battery pack's bottom [16-18].

The chassis structural design of new energy cars is more adaptable and affects vehicle performance compared to fuel-powered vehicles. The integrated battery and high amount of unsprung mass affect the center of gravity and stability of the new energy vehicle. The coordination and collaboration between the power battery module and the chassis ...

The review shows that nano and graphene models, with their corresponding energy systems, significantly improve the performance of lithium batteries, thus supporting ...

data support for the design of reasonable bottom impact resistance performance goals for new energy vehicle traction battery systems. ... Schematic diagram of the power battery system structure for new energy vehicles
Materials commonly used in traction battery systems include steel and aluminum

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In the structural design of new energy bus bodies, material selection is crucial. A comparison of various materials revealed their cost-effectiveness in achieving lightweight designs, reducing ...

The four primary components of the battery package's mechanical structure design process are parameter determination, structural initial design, optimization of simulation ...

The design variables for the bottom impact and heat dissipation models of the 3D star-shaped NPR structural battery pack include three key aspects: (1) the NPR inner core's unit cell structure parameters; (2) the condenser shell thickness; (3) the cooling water flow rate.

The study analyzed the bottom impact safety performance of traction battery systems under different damage factors, offering crucial reference and data support for the design of ...

Therefore, an efficient and safe module structure design that maximizes the energy density of a module while preventing various failures that can actually occur in battery ...

the battery pack. 2. Lightweight Design of Automotive Battery Packs Based on ANSYS 2.1. Battery Pack Symmetry Design Before the design of the battery pack in this study, the layout of the square ...

The integration of the battery pack's housing structure and the vehicle floor leads to a sort of sandwich structure that could have beneficial effects on the body's stiffness (both torsional ...

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