# Battery Module Design Report

What is a battery module?

At the heart of every EV lies a remarkable technological innovation - the battery module. These compact,powerful energy storage unitsare revolutionizing the automotive industry and have become the backbone of sustainable transportation. Central to the development of high-performance EVs is the design and engineering of the battery module.

How a battery design is developed?

The design solutions are assessed from an assembly,disassembly and modularity point of view to establish what solutions are of interest. 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.

How to determine the cost-effectiveness of battery modules and battery packs?

Material selection and assembly method as well as component designare very important to determine the cost-effectiveness of battery modules and battery packs. Therefore,this work presents Decision Matrix,which can aid in the decision-making process of component materials and assembly methods for a battery module design and a battery pack design.

How a battery can be modularised?

A battery has several ways to implement modularisation and among these are design of the housing and moduleas well as concerning the management of its environment.

What is the difference between a battery module and a module frame?

The battery modules on the other hand,are already modularisedin the way that the same type is used throughout the pack. Next,the module frame consists of one frame with equally distributed gaps for the battery module connections. Two respectively three of these frames,modules,can be applied in the heavier trucks.

How many modules are in a car battery pack?

The BMS and power relays can be found inside the pack whereas the DC-DC converter,HV controller and other HV units are mounted in other parts of the vehicle. Furthermore,the pack consist of ten modules,divided in two rows and two levels with the lower modules containing 30 cells and the upper modules 24.

Thereafter, benchmarking of internal and external batteries is performed by using the functions as guidelines, resulting in a variety of design solutions. The design solutions are assessed from ...

During the design of a modular battery system many factors influence the lifespan calculation. This work is centred on carrying out a factor importance analysis to identify the most relevant variables and their interactions. The analysis models used to calculate the reliability of the batteries are the state of health (SoH) and the Multi-State ...

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Design Report of the High Voltage Battery Pack for Formula SAE Electric Liam West, Barry Shepherd, Nathaniel Karabon, Josh Howell, Mike Pyrtko Department of Mechanical Engineering University of Wisconsin-Madison December 12th, 2016 1 Executive Summary This year, Wisconsin Racing (Formula SAE at UW-Madison) is building its first ever fully electric race car ...

Central to the development of high-performance EVs is the design and engineering of the battery module. Finite element analysis (FEA) plays a pivotal role in optimizing battery module performance, safety, and reliability.

The Battery Design Module models and simulates the fundamental processes in the electrodes and electrolytes of batteries. These simulations may involve the transport of charged and neutral species, current conduction, fluid flow, heat transfer, and electrochemical reactions in porous electrodes. You can use this module to investigate the performance of batteries at different ...

Abstract: The work presented focuses on a material efficient, modular design of a battery module for vehicle applications. Furthermore, the possibility of disassembly of individual components was considered.

This report discusses the design of an accumulator pack and the tractive system for an FSAE electric race car. The accumulator is a custom-built lithium-ion battery pack that includes everything required for safe operation and to supply power to the motor controllers. FSAE constraints for the competition are met by conducting a thorough ...

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