

Case Study on Casing of Li-Ion Battery in Electric Vehicles: Material Selection, Cell Stacking, and Mechanical Performance

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Abstract: *This paper presents a comprehensive case study investigating battery casing systems in modern electric vehicles, with specific focus on cell arrangement configurations, material selection, and the mechanical properties that influence performance. The study examines the evolution of battery casing designs from early electric vehicle prototypes to current production models, highlighting the transition from rudimentary protective housings to sophisticated thermal management systems with integrated structural functions. Our literature review synthesizes recent advancements in battery casing materials comparing the various batteries used in the industries and their properties. The analysis encompasses the impact of battery arrangements, design and properties of lithium-ion cells and their materials. The primary objective of this research is to evaluate how different casing materials and cell arrangement strategies impact battery pack performance, safety and longevity in real-world electric vehicle applications. This study aims to identify optimal design approaches that balances thermal management, structural protection, and manufacturing feasibility for next-generation electric vehicle battery systems.*

Keywords: Lithium-ion battery casings, Material selection, Cell stacking configurations, Thermal and mechanical performance optimization

