

Design Optimization Of A Battery Rack System Based In Thermal Analysis

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Abstract

Verification for thermal performance of battery stack system is of critical importance during the design stage of any energy management system. The temperature of batteries during charging and discharging cycles should not exceed a permissible value. In current analysis work, Multiphysics analysis model of a battery rack system based in flow dynamics & heat transfer is established for design optimization and validation ensuring fewer prototypes. The flow distribution of cold air from cabinet AC is mapped inside the battery rack system enclosure to study the thermal profile of individual battery. The model is further enhanced to study a flow network of ducts to ensure uniform and efficient cooling. The flow network is designed for equal mass flow rates by a series of iterative analysis. Enhancement in the system performance is noted in the form of drop in the temperature rise value on comparison with the previous model.