Analisis Kinerja Sistem Pendingin Air Radiator Rangkaian Baterai Lithium Ion 48volt 36ah Pada Proses *Charging* Dan *Discharging*

oleh
Mohammad Arifatulloh
Program Studi Mesin Otomotif, Jurusan Teknik
Politeknik Negeri Jember

ABSTRAK

Performa sistem pendingin sangat berpengaruh terhadap kestabilan suhu baterai lithium-ion pada kendaraan listrik, khususnya saat proses pengisian (*charging*) dan pengosongan daya (*discharging*). Penelitian ini bertujuan untuk menganalisis kinerja sistem pendingin berbasis air radiator yang menggunakan pipa tembaga dan peltier 12V sebagai pendingin tambahan. Variasi yang digunakan meliputi ukuran pipa (1/2 inci dan 1/4 inci) dan laju aliran cairan pendingin (1,3 L/M, 2 L/M, dan 3,9 L/M). Pengujian dilakukan pada baterai lithium-ion 48V 36Ah selama proses *charging* dan *discharging*. Hasil penelitian menunjukkan bahwa sistem pendingin mampu menurunkan suhu baterai secara signifikan, dengan penurunan tertinggi mencapai 3,5°C saat *charging* dan 3°C saat *discharging* pada laju aliran 3,9 L/M. Pipa berukuran lebih besar juga memberikan performa pendinginan yang lebih baik. Dengan demikian, sistem pendingin berbasis air radiator ini efektif dalam menjaga suhu optimal baterai, meningkatkan efisiensi kerja, dan memperpanjang umur baterai.

Kata kunci: baterai lithium-ion, sistem pendingin, air radiator, peltier, *charging*, *discharging*

Performance Analysis of Radiator Water Cooling System of 48volt 36ah Lithium Ion Battery Circuit in Charging and Discharging Process

by

Mohammad Arifatulloh
Automotive Engineering Study Program, Engineering Department
Jember State Polytechnic

ABSTRACT

The performance of the cooling system greatly affects the temperature stability of lithium-ion batteries in electric vehicles, especially during the charging and discharging processes. This study aims to analyze the performance of a radiator-based cooling system that uses copper pipes and 12V Peltier as additional coolants. The variations used include pipe size (1/2 inch and 1/4 inch) and coolant flow rate (1.3 L/M, 2 L/M, and 3.9 L/M). Tests were conducted on a 48V 36Ah lithium-ion battery during the charging and discharging processes. The results showed that the cooling system was able to significantly reduce the battery temperature, with the highest decrease reaching 3.5°C during charging and 3°C during discharging at a flow rate of 3.9 L/M. Larger pipes also provide better cooling performance. Thus, this radiator-based cooling system is effective in maintaining optimal battery temperature, increasing work efficiency, and extending battery life.

Keywords*: lithium-ion battery, cooling system, water radiator, Peltier, charging, discharging*