

Performance Demonstration of Lithium-Ion 18650 Custom Built Battery for 1,2 kW BLDC Hub Motor Considering 70% Depth of Discharge Activity

By

Mohammad Wahyu Atmara

*Studi Program of Automotive Engineering Program, Majoring of Engineering
State Polytechnic of Jember*

ABSTRACT

This research aims to determine the performance of the lithium-ion 18650 48V 20Ah battery pack design using Samsung 26-F cells. The design was tested by measuring the total voltage and discharging to compare the theoretical battery capacity with the actual results. The measured total voltage was 54.6 volts, which is higher than the design voltage of 48 volts, possibly due to the battery pack being charged. The discharging test was conducted using a 1200 Watt BLDC Hub load at a constant speed of 708 rpm. The capacity test was performed by discharging the battery to 70%, resulting in a capacity of 11.74 Ah, slightly lower than the theoretical calculation based on the datasheet, which was 14.56 Ah. During the discharge test, the voltage gradually decreased with the duration of usage, but the current strength showed an inverse relationship. As the voltage approached undervoltage levels, the current strength increased. The capacity values obtained from three repeated tests of discharging to 70% showed consecutive decreases in battery capacity: 11.74 Ah with a duration of 11.08 hours, 11.47 Ah with a duration of 11.03 hours, and 11.15 Ah with a duration of 11.26 hours. Therefore, the research results indicate that discharging the battery to 70% significantly affects its capacity.

Keywords: *Lithium Ion 18650 Battery, design and construction, discharge, capacity.*