

ANALISIS SISTEM PENDINGIN BATERAI DENGAN METODE *LIQUID COOLING* SYSTEM MENGGUNAKAN *COMPUTATIONAL FLUID DYNAMICS* (CFD)

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ABSTRACT

This study aims to determine the effect of different casing materials on the cooling performance of a lithium-ion battery using a liquid cooling system. The test was conducted virtually using 3D ANSYS Fluent simulation software. The object of this research is a cylindrical battery with a nickel core. This battery is cooled by a liquid with a constant inlet temperature set at 300 K. The shape and size of the cooling channels were kept constant, with the gap between the liquid channels locked at 2 mm. This ensures that the cooling results are purely influenced by the casing material, not the channel design. The three casing materials tested were aluminium, copper, and stainless steel. The simulation results show that the type of casing material greatly affects the final temperature of the battery. From a very hot initial temperature of 176°C, the copper casing successfully reduced the temperature most drastically to 48.85°C. This was followed by stainless steel 51.85°C and aluminium 60.85°C. Copper performed the best because of its high thermal conductivity, allowing heat from inside the battery to be quickly transferred to the cooling liquid. In conclusion, the performance of the battery cooling system can be maximized without having to change the design of the water channels, simply by choosing a casing material that conducts heat rapidly, such as copper.

Keywords: *lithium-ion battery, liquid cooling, CFD, casing material, temperature distribution.*