

## Characterization of a Finned Heat Sink for a Power Inverter

**F. Onoroh\*, O. O. Adewumi, M. Ogbonnaya**

Department of Mechanical Engineering, University of Lagos, Akoka, Yaba, Lagos state, Nigeria

Corresponding author; fonoroh@unilag.edu.ng

### Abstract-

Heat is a by-product which is constantly being generated in the operation of a power inverter and if left unchecked will inevitably lead to the damage of the device. Hence a means to efficiently dissipate this heat has to be employed. In this research, a heat sink is mathematically modelled and its thermal performance was evaluated using ANSYS software and experimentally validated. The optimisation of the heat sink was done with the aid of the FMINCON optimization tool in MATLAB. A K-type thermocouple and a three channel temperature logger, MTM-380SD, with real time data logger were used to obtain temperature data of the heat sink for the purpose of experimental validation. The optimized heat sink parameters are heat sink length and width, number of fins, base thickness, fin height, thickness and spacing. Results show that the percentage deviation between the simulation and experimental temperature results for a pulse load of 300W is 8%, for a pulse load of 460W is 3%, for a pulse load of 600W is 8%, for a pulse load of 1015W is 2%. The maximum simulated and experimented temperatures are 84°C and 85.4°C. Thus the inverter can be safely and reliably operated.

**Key words:** Heat sink, Optimization, thermal performance, data logger, load, Simulation.