DESIGN AND THERMAL MANAGEMENT OF BATTERY PACK FOR MEDICAL DEVICES

Masoumeh Yaghoobi[1,a], Irina Gotsiridze[1,b]

[1]Georgian Technical University, Tbilisi, Georgia

[a]masoumeh.yaghoobi@gmail.com, [b]i.gotsiridze@gtu.edu.ge

Abstract

The health and medical industry must manufacture custom made battery solutions to meet requirements to work under extreme conditions. In this project we designed a battery pack using COMSOL Multiphysics with finite element analysis.

Our pack is containing 16 pieces of battery 38120 LiFePo4 and the cells kept together with special plastics. The mass of each cell is 330 grams with 38-millimeter diameter and 120- millimeter height. Each cell provides 3.2 volts of electrical energy and the electrical current is 100 A. The aluminum battery body with thickness of only 1.25 mm, keeping cells together and away from dust and rubbish.

The temperature of cells after few minutes of working, reach $47^{O}C$ and If the temperature of the device would be high, tissue damage may occur. So, we provide a cooling system to make it cold and near normal weather conditions.

With Thermal management analysis we put 50 mm SUNON fan on the battery pack. Two 15*80 mm canals made for transferring hot air to outside. The production of air by fan is 13^{CFM} and 1.4 wats is usage of electricity for this fan.

The price of whole battery pack including 16 battery cells will be 176 USD and price for fan and aluminum box is only 10 USD. The price for whole battery pack will be around 186 USD.

The thermal management of battery pack showed that the desired fan can cool the whole battery pack and control the temperature perfectly. This price can show that with just small amount of spending we can provide a reservoir electrical system for all our medical equipment's.

Keywords: Medical Devices, Thermal Management, Battery pack, Lithium Battery