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"THERMAL TRANSIENT ANALYSIS ON BATTERY AIR COOLING SYSTEM OF AN ELECTRIC VEHICLE"

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ABSTRACT

Electric vehicles (EVs) are favored Lithium-particle batteries for energy capacity on its specialized elements. The greater expense, low release rate, long life cycle, and restricted energy thickness of the presently accessible particle battery brings about low effectiveness to defeat these issues at their fullest limit. So modelling of cooling plate has done by Solidwork 2021 software and thermal simulation has performed on ANSYS 19.2 software. Here find out temperature results Battery cooling system are taking like exiting design and new design temperature and heat flux results. So here it is cleared that exiting battery cooling system more temperature distribution and less heat flux released these all data find out with help of simulation software by ANSYS workbench 19.2 Thermal transient simulation platform So here find out less value of temperature and heat flux new battery cooling system.

Key Words: *Structure Analysis, Disc, FEM, Braking System, Automotive Industry.*

I. INTRODUCTION

Electric vehicles (EVs) are favored Lithium-particle batteries for energy capacity on its specialized elements. The greater expense, low release rate, long life cycle, and restricted energy thickness of the presently accessible li-particle battery brings about low effectiveness to defeat these issues at their fullest limit [1].

The exhibition of EVs is profoundly dependent on the battery limit and its center temperature assumes a significant part in battery execution. Wan et al [2] concentrated on warm execution of a smaller than expected circle heat pipe utilizing water-copper nanofluid. Mochizuki et al (2014) concentrated on Heat pipe-based detached crisis center cooling framework for safe closure of an atomic power reactor. Zhao et al [3] audited the warm exhibition further developing techniques for lithium-particle battery anode adjustment and warm administration framework. The battery temperature strongly affects charging and releasing pace of the battery. This makes the warm administration of an EV battery pack critical, plan of energy-thick packs need to utilize hearty cooling frameworks, regularly utilizing fluid cooling circles with many channels. The intricacy of these frameworks adds to the expense - somewhere near 10-20% of the general expense of the battery pack. Li-particle batteries are especially defenseless to warm flee occasions for one or two reasons, including their high energy content and their inclination to self-heat once the electrolyte arrives at a specific temperature (from 70° to 130° C). Li-Ion cells are normally exposed to crumbling with time because of their working circumstances and condition of charge. Temperature significantly affects the productivity of essentially all batteries [4]. Because of notoriety of fast charging and execution driving, the hotness misfortunes in the cell increments because of high current in the cells [4]. There are two principle wellsprings of hotness age in a battery cell: electrochemical activity and joule warming because of the movement of electrons inside a battery cells. The temperature scope of 25 °C

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to 40 °C gives the ideal working circumstances to Li-particle batteries and in the event that the temperature is raised over 50 °C it becomes destructive for the life expectancy of the batteries;. Indeed, even a solitary cell's youthful weakening can decrease the exhibition and productivity of the entire battery pack extensively. The primary point of the BTMS is to direct the temperature of the cells of the battery and along these lines increment the life expectancy of the battery. There are two primary kinds of BTMS: dynamic frameworks and aloof frameworks. Conventional vehicles use fossil fuel and pollution due to combustion is a serious concern on the environment. The scope of Electric vehicles (EV) has been essential due to the adverse impact of fossil fuels on the environment.

An electric vehicle does not use any fossil fuel for power generation and has zero emission.Many initiatives have been taken to reduce air pollution using non-conventional energy sources. Electric vehicles use the electric battery and help to reduce pollution. External electric supply charges the battery which supplies electric power to the motor. The electric motors transfer power to the front and back wheels. Many automobile industries are shifting from internal combustion engine cars to electric vehicle.

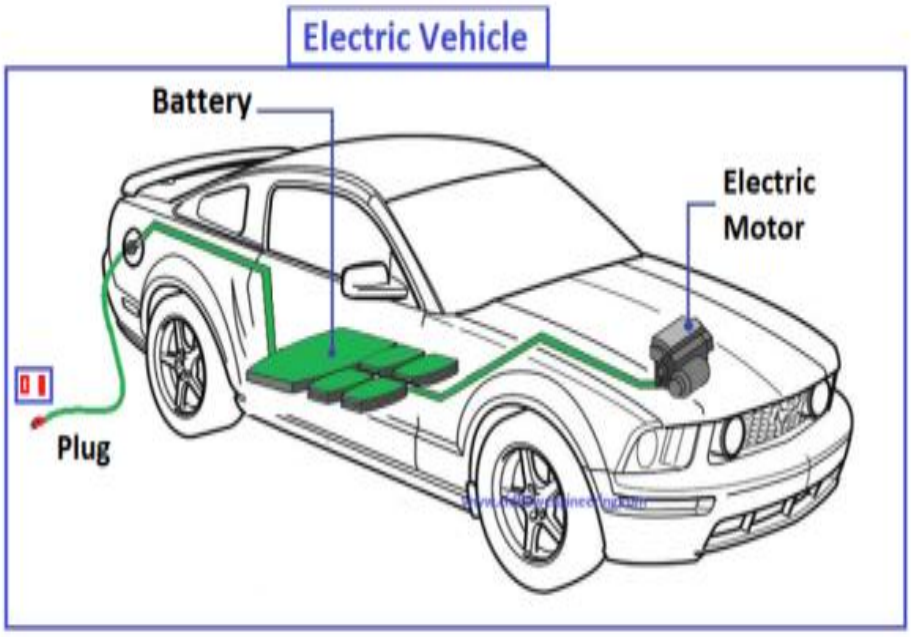

Fig. 1 Electric Car

II. THERMAL MODELLING OF COLLING FRAMEWORK

The compound response in the Li-particle cells creates hotness and this joule heat is sent from between the cells to the hotness pipe cooling plate with the assistance of coolant, which is utilized to move the hotness from the cells to the hotness pipe cooling plate. Then, at that point, this hotness is sent through heat lines to the contact plate, and afterward the consolidated hotness of the cooling plate and contact plate is moved to the remote hotness move heat pipes. And afterward the hotness is sent from a distance to the subsequent contact plate by the remote hotness move heat pipes, which is then associated with the fluid cooled cold plates. Cold plates communicate heat by constrained convection of cooling water through the miniature channels. Water is mostly utilized as a coolant since it has outstanding warm properties and high hotness move coefficient. The net warm opposition of the hotness pipe-based BTMS can be separated into 3 kinds of warm obstruction: contact obstruction, heat pipe obstruction and the constrained convection obstruction of the virus plates

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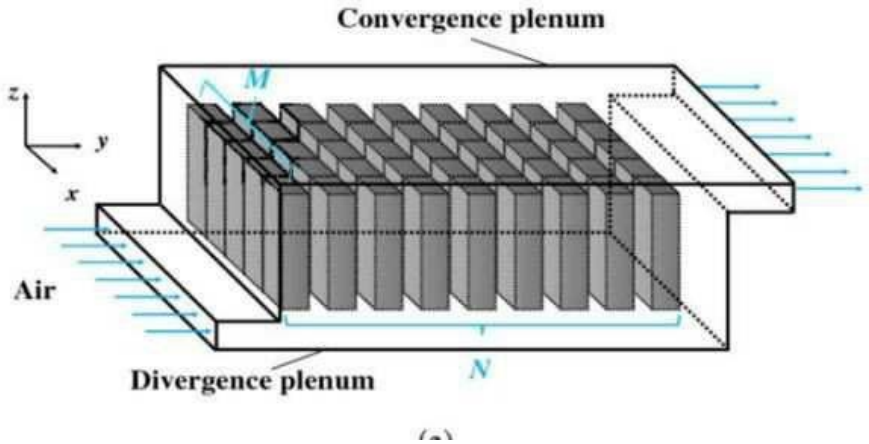

Fig.2 Battery Air Cooling System

Battery Thermal Management System (BTMS)

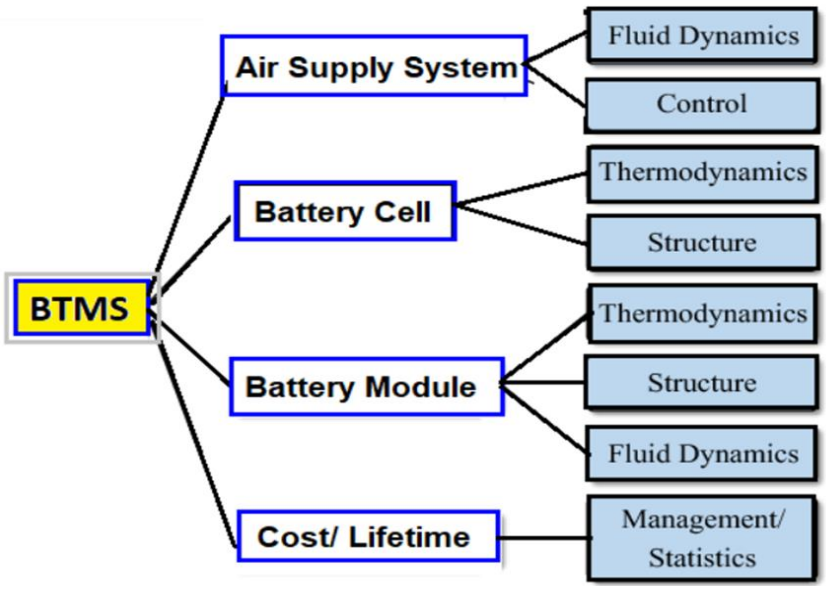

Fig.3 BTMS system

III. RESEARCH METHODOLOGY

With everything taken into account, there are two central fragments that were performed at this moment. The essential fragment is to develop a 3-layered model of the grip circle, followed by performing restricted part examination using business limited part (FE) programming to consider the warm furthest reaches of the business grasp plate as showed up in figure under.

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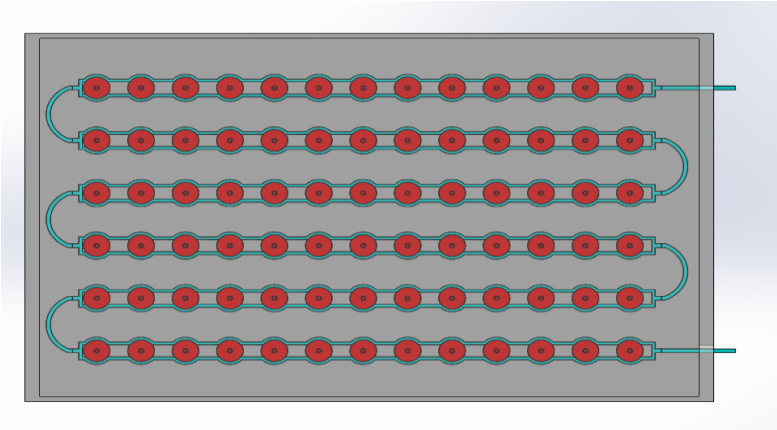

Fig.4 CAD model of batter cell arrangement case 1

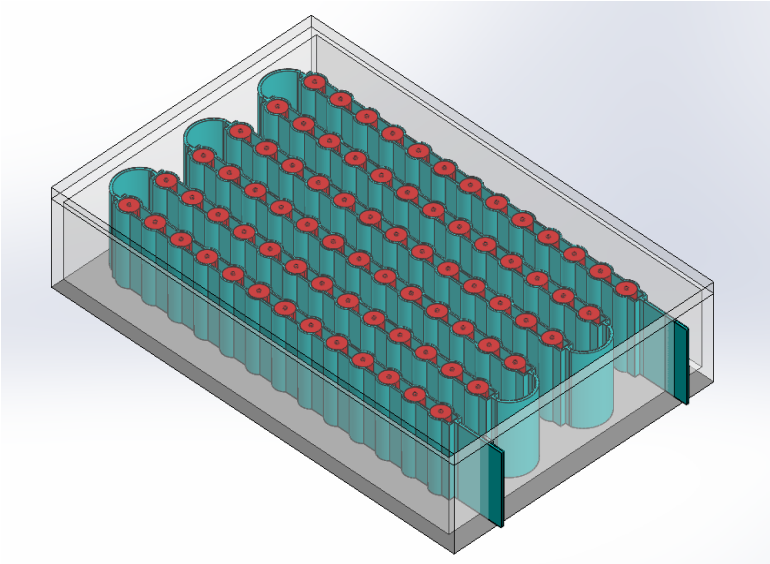

Fig. 5 CAD model of batter cell arrangement case 2

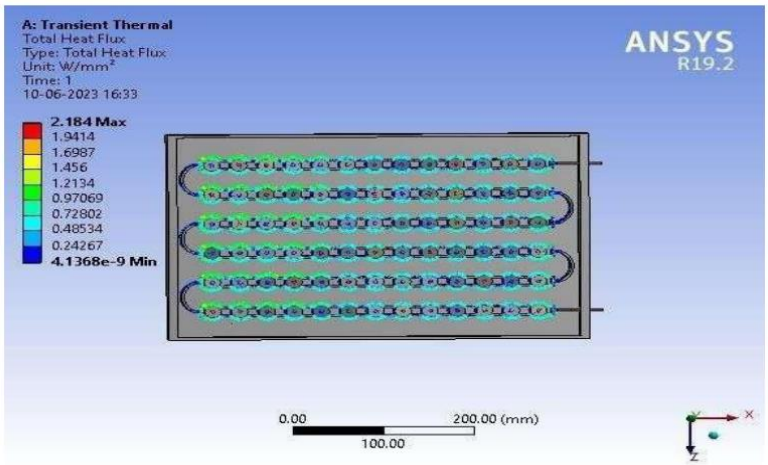

Fig. 6 CAD model heat flux result case 1

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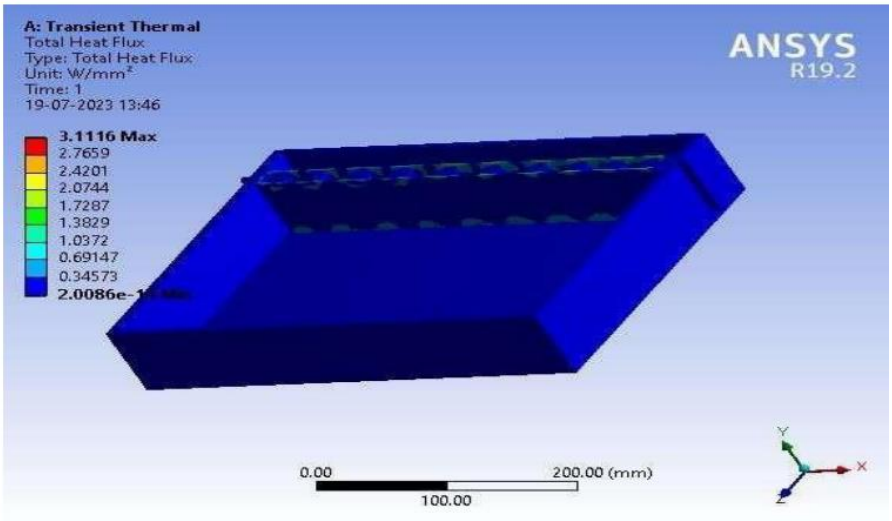

Fig. 7 CAD model heat flux result case 2

III. CONCLUSION

Here it is cleared that exiting battery cooling system more temperature distribution and less heat flux released these all data find out with help of simulation software by ANSYS workbench 19.2 Thermal transient simulation platform So here find out less value of temperature and heat flux new battery cooling system

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