International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 5 May 2023, pp: 1019-1021 www.ijaem.net ISSN: 2395-5252

Fast Charging Of Battery by Using Copper Tube Cooling System

1 Prof.STM Zaheer, 2 Pornima Baghele, 3 Sakshi Datir, 4 Khushali Girhepunje, 5 Snehal Meshram, 6 Prajkta Satpute

1Assistent Professor,2,3,4,5,6UG Students
Department of Electrical Engineering,
Government College of Engineering Chandrapur, Maharashtra, India

Date of Submission: 15-05-2023 Date of Acceptance: 30-05-2023

ABSTRACT:
In a modern-day application the storing of electricity is crucial, in order to store electricity batter is essential. Batteries when kept in isolation or a closed compact space, as in power plant or electrical vehicle tent to heat up drastically resulting in depreciation of efficiency as well as lifetime of the battery. The temperature of the battery mainly depends on two factors. The factor that responsible for the heat generation in the battery are charging and discharging of the battery. This batter dissipated by the battery during charging and the discharging condition is controlled by copper tube liquid cooling system. The fluid is pimped by the motor connected to the battery system which used to pump the liquid around the battery layer externally. he batteries optimal temperature varies between 25ºC and 30ºC. Battery thermal management system that keeps the battery temperature within the desired rang will significantly improve the power consumption and enhance both the change storing capacity and battery life.

KEYWORDS: Copper tube cooling, Water cooling and Fast charging.

I. INTRODUCTION:

Nowadays, the world is demanding batteries for their daily needs. The generation of power is largely dependent on fossil fuels, including coal, oil and natural gas. About 80% of fossil fuels are used for power generators, and the effects of fossil fuels release large amount of carbon dioxide greenhouse gases into the air, causing global warming, climate change, etc. fossil fuels are decaying in the future, therefore the world is releasing the use of renewable energy sources, including solar energy, wind energy, and hydroelectric energy, instead of fossil fuels-based sources. The device that stores energy in the form of battery is simple to use and has a low environmentalimpact. Compactable batteries are primarily used to meet daily needs, which is why people seek to use fast-charging batteries.

In this project we are working on lithium-ion batteries. Lithium-ion batteries are temperature sensitive. The battery cycle, performance, Reliability and safety are affected by temperature. Given the sensitivity of temperature a lot of heat energy emitted during the charging or discharging process. There are various cooling technique are available to sustain the batteries made from lithium-ion at optimal temperature we are using liquid cooling by using copper tube. Here we are using water as coolant. A liquid cooling system works by passing water through the copper tube. Power by water pump. The coolant is pushed through the copper tube as the water travels to this passage it absorbs heat from the battery.
The objective of project is to reduce the charging time of batteries and increase their lifespan.

II. LITERATURE REVIEW:

There are has been major contribution around the battery system construction and development cooling system for the battery system. The battery thermal management system deals with continuous monitoring of the charge, Health and thermal model of battery system. Cooling system of battery is the major role in order to reduce the temperature level of battery and helps to run in its operating range. In this battery thermal managing system, the major emphasis is given to liquid cooling and the observation made from this project allow us to develop efficient cooling system for the battery.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 5 May 2023, pp: 1019-1021 www.ijaem.net ISSN: 2395-5252

III. METHODOLOGY:

At much lower mass stream rates, liquid cooling will accomplish better warm exchange. In cases where expensive warm loads or tall power densities ought to be disseminated and discuss would require a very tall stream rate, a liquid-cooled framework is by and large utilized.Piped fluid cooling frameworks haveway better warm control of the Piped fluid cooling frameworks have way better warm control of the battery since it is less demanding to conduct warm absent from batteries than air-cooling frameworks. One disadvantage is the system's restricted supply of liquid compared to the basically boundless sum of discuss that can stream through a battery.

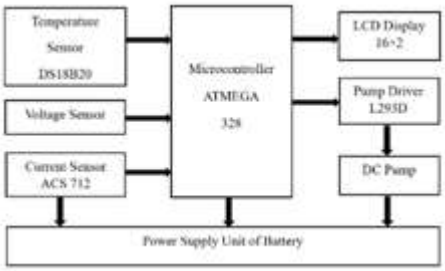

Fig. 1 Block Diagram

BATTERY:

Used for generating pure DC Voltage for the operation of ZVS driver. In our project we use two UPLUS new technology battery. In our project we connect two batteries in parallel giving current of 16.2 A at a constant voltage of 12 V.

Having specification -
US 12-7.2 12V 7.2 AH
Max Charging current:-2.16A
Value Regulated lead acid rechargeable Battery

Fig. 2 Battery

LIQUID COOLING BY USING COPPER TUBE:

Liquid cooling using copper tubes is a method for efficiently dissipating heat from battery. Copper is an excellent conductor of heat, making it an ideal material for transferring heat away from the source and dispersing itthroughout the cooling system. Copper has high thermal conductivity, whichmeans it can efficiently transfer heat from the heat source to the cooling liquid. This property allows for effective heat dissipation and temperature regulation. It allows for more effective heat dissipation, which can result in lower operating temperatures for the battery, potentially leading to improved system stability and increased overclocking potential.

Fig. 3 Liquid Cooling by using copper tube

Battery thermal management system is used to maintain the thermal state of battery by using temperature sensors. The DS18B20 temperature sensor is used to detect the temperature range of the battery. The normal operating range of battery is 25℃ to 45℃. For the purpose of this project, we have taken it as 42℃. A DS18B20 is connected physically to the battery and takes real time temperature reading of the battery which is then displayed on the display connected with the microcontroller, for this purpose ATMEGA328 is used as controller. A pump circulates the water through the battery, a cooling system is connected which reduces water temperature and radiates the heat. In this way the temperature of the battery is reduced to ambient temperature.

This system is used along with battery system and helps coolant liquid flow through the battery to reduce its temperature. This system must be properly insulated so that heat can be properly conducted and outer environment do not affect the temperature of the coolant. This system should also be reliable and leak proof as if any leakage takes place, it can short the battery and this can be harmful for the safety of battery.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 5, Issue 5 May 2023, pp: 1019-1021 www.ijaem.net ISSN: 2395-5252

Fig. 4 Fast Charging of Battery by using copper tube cooling system.

IV. RESULT:

$$Time = \frac{Batterycapacity}{ChargeRateCurrent}$$

So in this way we are using copper tubes to cool down the battery temperature to make it more efficient and reliable by reducing its heat losses.

Capacity	Charge A hr	Total Time (Hr)	10% loss	20 % loss	30 % loss	40% loss
9000	1	9	9.900	10.80	11.70	12.60
9000	2	4.5	4.950	5.400	5.850	6.300
9000	3	3.0	3.3	3.6	3.9	4.2

From above Fig. 5 we can observe that as the losses increasing charging time also increases.

V.CONCLUSION

A methodology has been proposed for designing and optimizing the battery with help of the cooling tube by using the motor pump. The cooling tube isemployed in this system in order to reduce the temperature level of the battery pack. The approach of the surrogate model further improved the configuration of the cooling layer.

Thus, energy wasted due to heat dissipation in vehicle batteries is effectively saved by using copper tube which helps to reduce the temperature. By passing water, we get efficient output energy economically. This will also increase the life of batteries and will give effective and smooth working with least maintenance.

Renewable energy technology developments, trends and policy implications that can underpin the drive for global climate change.

REFERANCES

[1]. A.G. Olabi, The 3rd international conference on sustainable energy and environmental protection SEEP 2009 – Guest Editor's Introduction Energy, 35 (2010), pp. 4508-4509

[2]. A.G. Olab, Developments in sustainable energy and environmental protection Energy, 39 (2012), pp. 2-5

[3]. A.G. Olabi, M.A. Abdelkareem, Renewable energy and climate change Renewable and Sustainable Energy Reviews, 158 (2022), Article 112111

[4]. A. Foley, A.G. Olabi, Renewable energy technology developments, trends and policy implications that can underpin the drive for global climate change

[5]. H. Jouhara, A.G. Olabi, Industrial waste heat recovery

[6]. E.T. Sayed, T. Wilberforce, K. Elsaid, M.K.H. Rabaia, M.A. Abdelkareem, K.-J. Chae, A.G. Olabi, A critical review on environmental impacts of renewable energy systems and mitigation strategies: Wind, hydro, biomass and geothermal Science of The Total Environment, 766 (2021), Article 144505

[7]. K. Obaideen, M. Nooman AlMallahi, A.H. Alami, M. Ramadan, M.A. Abdelkareem, N. Shehata, A.G. Olabi, On the contribution of solar energy to sustainable developments goals: Case study on Mohammed bin Rashid Al Maktoum Solar Park