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Challenge and Issues of Lead-Acid Batteries: a Review

Osama Ahmed, Dhia'A Mohammed, Anees Abdu,
Salah Al-Deen Saif, Gamal Al-Mansoub and Khalid Al-Mahmody

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Abstract— Renewable energy is the modern industrial revolution and all studies and researchers focused around this area of energy because this type of energy is friendly to environment and cheaper comparing to combustion fuel. In our lookup we address an example of renewable energy which depended on chemical energy store, this instance is a kind of batteries that known as 'Lead-acid battery' . We pick these forms of battery depending on advertising and marketing target and good service, financial characteristics of this type of batteries that make it suitable for many purpose, therefore provable variety of many people in the world and Yamani and society. our research centerline on studying problems and issues of this type of batteries and how we can reduce or eliminate the consequences of these problems, additionally we targeted on development and how we can use new approaches to enhance properties and advantage of these battery.by the other hand limits the disadvantage of it. In this article we acquire many issues that face lead acid batteries to let the researchers to inspire many solutions and keep away from the deficiency of the recent products of batteries. The main motivation to do this article is a humanism hobby and feeling with heavyresbonsibility as I am engineer to remedy the largest troubles of power store, specifically in Yemen.

Index Terms— Friendly to environment Renewable Energy، Lead-acid battery.

1 INTRODUCTION

Lead-acid batteries has many properties that assist our selection to pick and interest to do these article, these properties situation with advertising and marketing goal and country earnings and many targets guide customer decision to purchase and use these kind of batteries. additionally, the residences of batter-is like, the raw material is accessible and cost effective and has the highest rate of recycling of all material in the world. for these reasons lead acid battery has a height level of advertising and marketing trend in the existing and fu-true. lead-acid batteries have natural properties such as mass, malleability, low melting point, corrosion re-distance, electrical properties and extended life, these properties make it integral in the life industries. though all these of properties, only that have many problems and challenges that can make the grasp race in the world.in Lead-acid batteries there are some matters that are allergic and our research focuses of these style that catered of batteries structure(design),type of materials and usually associated with other minerals such zinc copper, and silver used in the manufacturing, also material process consider numerous challenge in accordance to manufacturing .the failure mode of lead-acid battery de-pended mostly upon many elements that effect on lifetime of battery, such design and quality, type of responsibility being undertaken, and the diploma of care and preservation all through operation .In our research we will addresses some pointers about these failures to make inspiration to researchers and batteries manufacturers and builders to discover some solutions that they can apply them on these battery and get rid of failures

2. MATERIALS & METHODS

2.1. The Importance of Lead-Acid Battery in Our Life and It's Multiple Usages

Anything takes significant activity from industrial and investment organizations have to serve people and customers and meet with human demand. Lead Acid Storage Batteries is an Elec-tro-chemical system that converts electrical energy into direct current and electrical energy and can save it's power for long period of time thus, It is known as storage batter-is .After of world hostilities two manufacturing of lead acid bat-terry make bigger immensely influenced by means of the rapid development of automobile ,transportation and telecomenta-tion industry and has wide applications UPS/Inverters, Traction/Electrical Sub-Station, Telecommunication, Solar Photovoltaic system.

2.2. Operational, Chemical, Service &Manufacturing Issues of Lead-Acid Battery.

2.2.1. Degradation of positive and negative plate.

The most reason that impact of the life time of Lead-acid batteries is the degradation of effective component in batteries.so, the degradation component that can loses capacity of the positive plate is the loses of inter-particle contact due to morphological changes, slow conversion of fabric to an electrochemically dormant shape and plate sulphation due to corrosive stratification impact, in turn , the disappointment of the negative plate may happen via one of the taking after process, dissolvability in electrolyte, thermal decomposition during glue blending ,chemical reaction with sulphatic corrosive within the electrolyte.

2.2.2. Temperature effect.

As Lead-acid batteries depended on chemical reaction in its work (REDOX operation), and the temperature consider the most excellent catalyst factor that impact on these reaction, so require on us to choose the right surrounding of work environment for these batteries, expected battery life is indicated by the producer for batteries introduced in an environment around the reference temperature of 25c°,above these temperature battery life is decreased .the chief maturing mechanism is accelerated corrosion of the positive plate , framework structure and strap ,which increase exponentially as work of temperature. There are numerous variables that cause over-heating to the batteries such that, intensive utilize (charging and discharging use) and hiegh external temperature that can be causes water loses by its transformation into gas by electrolysis.

2.2.3. Charging issues.

The greatest risk of Lead-acid batteries is overcharging and overheating. There are three strategy of charging to begin with, steady current, at that point consistent voltage, third blended of them. The charging at the off-base drift voltage can radically increase corrosion, and advantage the battery by

removing plate salvation and reviving the plate [1]. self-discharge can cause loss of capacity in case they are consistently undercharged. The author in [1] illustrate that undercharged cause lead crystalline structure shaped and continue to develop and eventually reach to measure that cannot be effortlessly broken down by change current .and these gems physically involve more space than unique dynamic materials. Over discharging and not expeditiously recharged can cause hydration in Lead-acid batteries. The critical factor is that batteries stay in dis-charged condition for extended time.

2.2.4. Misapplication use.

Anything is planned for particular utilize and on the off chance that we utilize thing in other reason that has not planned to, it'll reach to disappointment mod some time recently the ensure period given by fabricating company .so Lead-acid batteries be appropriate on this reality. Also, misapplication use can cause mechanical damage of the cell

2.2.5. Hard sulphating.

There are many factors that cause hard sulphating such as low quality of formation, low quality of paste, cycling with incomplete charging and deep discharged those losses batteries capacities, thus batteries degradation.

2.2.6. Corrosion.

Corrosion is the logically operation in Lead-acid batteries, so the author in [3, 6] clarify the main cause that led to these types of chemically problem. The large effective reasons of these issues are low quality of grid, presence of air, bad operation of the charger and bad choice of charger cycle that may be cause of water loss by it's into transformation into gas by electrolysis.

2.2.7. Manufacturing issues

Most problems of lead-acid batteries take place during the operation age of battery, but sometime this problem had been created during the manufacturing process and this problem still to grow very quickly even if all precaution of the operation has done. According to author [6], low quality of finishing process and vibration it cans loss of electrical connection and therefore loss of battery capacity.

2.2.8. Other problem

By referring to [1, 3, 6] we are finding many problems that we will take some hints about them as follows.

2.2.8.1. Incorrect cell design and component selection, egg, short-calculates due to plate and separator faults.

2.2.8.2. Poor quantity control during manufacture, 2.2.8.3. pen-circuits arising from loose plates/thermals, and/or from the fracture of weak plate-to-bulbar bulbar-to-thermal or cell-to-cell connections, attack from contaminates, abuse, e.g., underarm, overarm, low electrolyte level (flooded systems), vibration, high ambient temperature, entry of harmful foreign, species, prolonged storage with insufficient recharging, - external and/or internal damage, e g, broken containers and covers.

2.2.8.4. Damaged terminals, electrolyte leakage. Number of impurities added to the electrode. Based on research [6], the capacity and life time of the batteries depended greatly on the structure of the active mass.

2.3. Relation between Size of Lead-Acid Batteries and Its Capacity to Electricity.

The big size of batteries is good thing to the electricity and not good for the user, high electricity means more galvanic cell, thus big size of batteries, so the customer needs contrast with the reality, but this reality is not compulsory on the costumer, so this demand of the costumers allow to the researchers to focused around these field of study to reach to good results and achieve a good investment. The capacity and cycle life of the battery depend greatly on the structure of the active materials. Hence, it was important to examine the structure of the two types of active masses and to elucidate how it was formed during the technological process of plate manufacture. We can decrease the size of batteries relatively to the volume of electricity by focused around three major condition such as structural design, type of materials, and depended on mixing method of the alloy that can be added [9].

2.4. Future of energy and lead acid batteries.

Energy considers from the main demand of people, so when we get some resources which give us many advantage and little deficiency, directly we will interest in these types of resources and keep it in our mind, then make it our studying trend, and these hadn't negated the logic. Lead-acid battery has much advantage and deserve from researchers to lighting-up it' s. By referring to author [1], lead-acid battery has heavy white and low energy output comparing with lithium-ion polymer battery, so the studding focuses on developing and create new material by controlling and smoothing the proportion of materials to be composited [7-8], and innovate new design to reduce the size of battery with the stable of electricity output. Currently, the intensively of studying around triple-effective parts in lead-acid batteries such, cathode, anode, and electrolyte and these study trend in the future.an example of these study is future cathode materials which are explicated by scientific, whereas uses more plentiful and/or safer cathode materials. These is classification to three type of material, These, lithium-air and sodium-ion [12]. also, the future work implies the End-of-life (EOL) treatment to enhance the performance of the batteries has been recycled [11-12]. According to [12], short battery life has corrosion resistance of the grid, thus the improving these corrosion resistances by alloy material modification. By referring to the same cite above, we must focus about thickness of electrode that we should to reduce the thickness from[2-3mm] to 1mm to enhance input/output performance. According to author [6], low quality of finishing of the process and vibration may loss of electrical connection and therefore loss of batteries capacity.

3. CONCLUSION

From over think about we conclude numerous things which rec-order as taking after and offer assistance the clients to avoid mishap-plication utilize and manhandle of this item. control the temperature in our battery framework is exceptionally imperative, and We must perform standard support. All issues did not make amid battery operation, but there are problems had been made amid fabricating, so must be on us centers almost these things and crush the root cause of issues rather than their side effect. Since of awful charging of lead-acid batteries the suggested to use a dedicative source that's costly device for charging, because in this way it guarantees appropriate charging and a long life of batteries. Occasional charge by controller to avoid capacity and early disappointment of batteries. Select-in the proper capacity

batteries for given electrical loads. As we are users, it must on us to fallow the list of Dos and Don'ts for operation and maintenance put ten by producer to maintain a strategic distance from the issues that can be happened in life time of battery and reduce battery proficiency. We are able compose the benefit title of the item which we utilize in Google and download the troubleshot of this item to know how to form a few assurance and operational safety measure, and make basic upkeep that can be the development of issues and issues of battery.

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