BATTERY SERVICES INTERNATIONAL
BATTERY SPECIALISTS

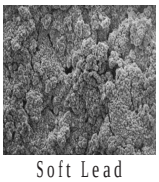
Understanding Failure and Recovery of Lead Acid Battery

Lead acid batteries are classified as a secondary battery. Secondary batteries are all types of batteries that can be resuse because you can recharge it. There are around 13 types of secondary batteries on the market today. Our concern here is only with the lead acid battery.

The known problem with lead acid batteries is that after a certain period of usage the battery decays to a state where accepting and holding a charge is no longer possible. Everyone that owns an motor-vehicle like a car or truck knows about this phenomenon. Owners of motor-vehicles often are surprised to find that their battery is not rendering the power it should after a session of charge and this failure manifests prior to the end of the expected warranty term provided by the battery manufacturer.

Lead acid batteries vary according to the electrolyte. Some lead acid batteries are made using a gelatinized electrolyte, hence the name of Gel battery. However, most batteries are made with a liquid electrolyte made of sulfuric acid. The issue with premature failure of batteries includes various aggravating factors such as the high procurement cost of replacement, the cost of business daily operation interruption due to down time, damages that can occur to the electric and electronic system in the motorvehicle or in a backup power supply unit . Another aggravation consist on going to the process of replacing the batteries again. Once a battery fails to accept a charge and fulfill its work capability, the battery is discarded or considered spent or scrap. Two questions that rise from this reality are: *Why does this happen*? & *What can be done to reduce battery failure?*

The first question, "*Why does this happen*?", has an easy response: lead acid battery failure is due to a hardening of lead sulfate on the electrodes or plates in each cell pack. From an electrochemical point of view, when charged, all car or truck battery (including Gel) have cells that contain two electrodes of which one is negatively charged made of lead (Pb) and the other is positively charged made of lead dioxide (PbO_2). These electrodes of oppose polarities are submerged in an electrolyte of approximately 33.5% sulfuric acid (H_2SO_4) and 63.5% water (H_2O). When a charged battery is used or under a load that discharges the battery, both electrodes go through an electrochemical reaction that turns the Pb in the negative plate, the PbO_2 on the positive plate, and the H_2SO_4 in the electrolyte into lead sulfate ($PbSO_4$). Due to this chemical reaction, the electrolyte loses the dissolved sulfuric acid and becomes mostly water. Thus, when a lead acid battery is discharged lead sulfates ($PbSO_4$) is formed on both plates and when charged again the lead sulfates decomposes back to original active materials of PB, PbO_2, H_2SO_4, and H_2O.


Soft Lead Sulfate ($PbSO_4$)


Hard Lead Sulfate ($PbSO_4$)

All lead acid batteries, flooded and Gel, sealed or vented, of any brand name and size must sustain this cycle of charge and discharge of both plates in each cell to keep forming soft lead sulfates at least until completing its warranty life. Even if the battery fails to reach the desire state of charge as per manufacturer specifications before or after life warranty, the fact is that all batteries that fail to be charged again do so because the plates (electrodes) in each cell pack remain discharged or depolarized. If an electrode (plate) remains discharged or do not reach at least 80% state of charge it is because a portion of the electrode, after a cycle of charge, has remained with the lead sulfates ($PbSO_4$) that did not decompose back to the original ingredients. This lead sulfates has become too hard to disassemble using regular or standardized battery charging equipment.

Battery Services International, LLC
1642 SW 12 Street, Miami, FL 33135
USA Tel: (800) 884-0690
INT Tel: (786) 317-7857 & (915) 256-5649

BATTERY SERVICES INTERNATIONAL

BATTERY SPECIALISTS

The second question, "*What can be done to reduce battery failure?*", is also easy to answer: use our Genesis Battery Recovery Process. The Genesis Process was designed to deal with the impurities that originate against good state of health of any lead acid battery. The functional objective of the Genesis Recovery Process is to prevent hardening of the lead sulfates and depolarization (discharging) of both negative and positive plates, thereby significantly reducing water loss. To summarize here, our battery recovery technology when applied on any lead acid battery specimen (Gel or flooded or sealed) brings out the following benefits:

1. Sustains run time of the cell as per manufacturer specifications or application
2. Eliminates discharging of the plates due to the hardening of lead sulfates
3. Secures increased life span reducing maintenance and procurement costs
4. Maintains the charge level of all batteries securing performance of both plates
5. Reduces the secondary evolution of hydrogen in the negative plates
6. Lowers the rate of positive plate corrosion resulting in longer life.
7. Increases the recombination of hydrogen that is normally vented out (important for Gel)
8. Reduces gassing and water loss (lack of compression).
9. Reduces charging current consumption due to higher efficiency
10. Lowers internal heat generation dissipating the potential for thermal runaway.


Sulfated Cell

The Genesis process allows recovery of lost capacity in any structurally sound lead acid flooded, sealed, and Gel battery. We can recover lost capacity of lead acid cells in state of charge of 0% and restore these cells to their original capacity, assuming that during diagnostic testing the battery is structurally sound. There is a significant amount of evidence that suggests premature capacity loss of lead acid batteries can be a result of polarization imbalances within the cells plates due to hard lead sulfate formation via Oswald repining effect. Many papers published to date suggest that discharged plates in a battery cells is due to hardening of the lead sulfate that clogs the pore structure in the paste causing premature failure. Of course, poor maintenance and dehydration also are indicated as battery killers. The use of our battery recovery process Genesis is a low-cost approach to minimize battery failure or to recover batteries considered spent or out of service.

All our services are guarantee and demostration of our technology can be arranged. If you are owner of a lead acid battery of any making, brand, or application, we would like to share with you our expertise about battery recovery capacitance and our technology named as Genesis Battery Recovery Process. Please contact us via email or call us. You can also visit our websites: *www.bsiopportunity.com*, *www.batteryrestoration.com.*

We will be happy to assist you to reduce battery procurement. Simply contact us now.

Battery Services International, LLC
1642 SW 12 Street, Miami, FL 33135 USA
USA Tel: (800) 884-0690
INT Tel: (786) 317-7857 & (915) 256-5649