

HOW IT IS MADE: THE LEAD ACID BATTERY - PART VI PRODUCTION METHODS OF GRIDS

LEAD GRID FOR LEAD-ACID BATTERY

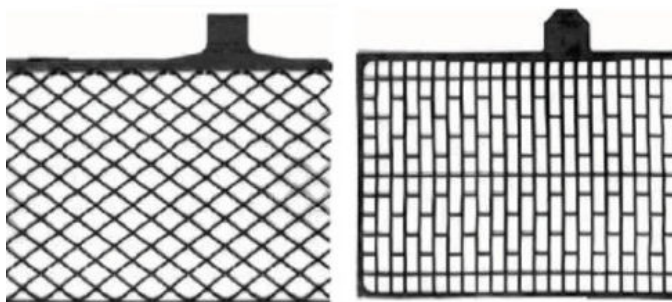
The lead grid in a battery serves two main purposes. It provides mechanical support for the active material. It also helps in the flow of electrons produced during the electrochemical reaction.

Different types of grid can be defined depending on the final use of the battery:

1. casting grid with shell mould;
2. continuous casting grid;
3. grid obtained with expansion systems (rolling strip);
4. grid obtained with punching systems (rolling strip);
5. grid obtained with die-casting systems.

CASTING GRID WITH SHELL MOULD

Liquid lead is poured into a shell mould to obtain the desired product. The mould is thermally controlled and has extractors. This method helps make different grid shapes at a low cost. It can produce a wide variety of grids. These grids are used in cars, electric traction, and uninterruptible power supplies. The process is manual, leading to low machine performance. The product quality is good, but it could be better.



Expanded grid

Punched grid

Battery Service Manual



CONTINUOUS CASTING GRID

A drum surface is carved to create a grid shape. Liquid lead is applied on this surface. Then, the cavities are filled with the lead. Excess material is then scraped off to only leave the thread cavities filled in. Once they have duly cooled down, they form the grid.

This system provides a cheap, but poor quality product. The so-called rotary cast system can be mainly used for the production of negative plates.

GRID OBTAINED WITH EXPANSION SYSTEMS

This grid is made by stretching a strip that comes from a rolling mill. It can make both positive and negative grids. The grid is stretched, so it doesn't have side frames. This makes it somewhat weak. However, it's good enough to make medium quality batteries.

GRID OBTAINED WITH PUNCHING SYSTEMS

The process begins with punching a strip the same width as the grid. The system is valuable but also costly. Two main factors contribute to its high cost. First, the strip production system is large. Second, there's a lot of material waste that needs recycling. The final product is of premium quality. This premium quality results from the strip's high crystalline density and the grid's perfect shape, achieved through moulding. Despite being expensive, these high-quality grids are mainly used to make positive plates for high-end batteries.



GRID OBTAINED WITH DIE-CASTING SYSTEMS

This grid is made using a die-casting system. Molten lead is pumped into a closed mould at high speed and pressure. A press keeps the mould closed. The lead fills it at a high pressure condition, thus obtaining a greater compactness of its crystalline structure. Therefore, the grid's resistance to the corrosion process is higher. Afterwards, it will be enveloped by the active material, which is kept in place by a special container. The product we get will not work as well as the standard version. However, it will last much longer when we look at charging cycles.



ERNEST VOLCKMAR AND THE SPEEDBOAT ON THE THAMES

In 1882, Ernest Volckmar, a scientist, made headlines. He was on a mission related to lead-acid batteries. Volckmar was the first person to suggest using a grid in these batteries. This idea received a lot of media attention.

He worked with engineers Messers and Sellon. Together, they developed a new version of Planté's accumulator. They used the new Siemens Dynamos for help. With this technology, they built the first electric boat. This boat could handle the stress of navigation.

Reference

Batteries Step by Step: The Lead-Acid Battery
SOVEMA: Equipment for Lead Acid Batteries.