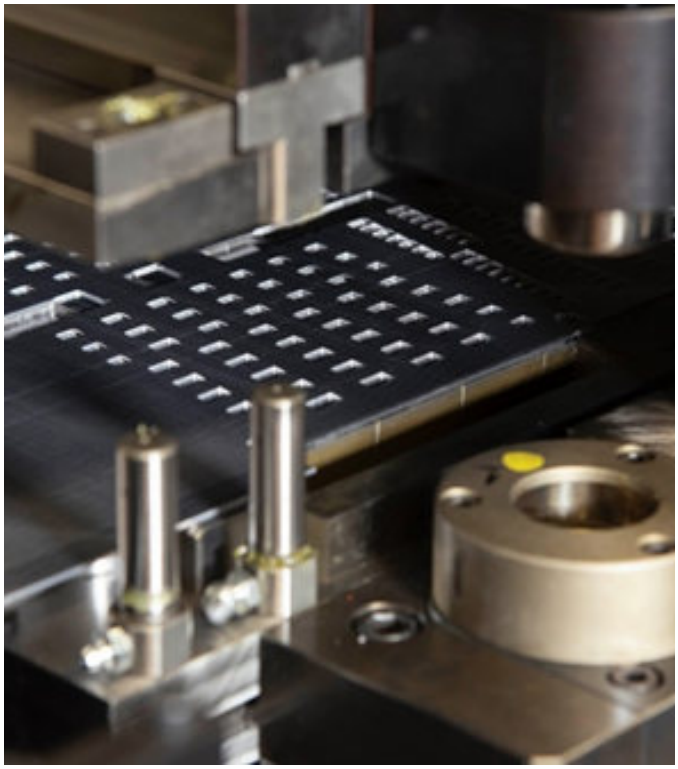
HOW IT IS MADE: THE LEAD ACID BATTERY - PART 3

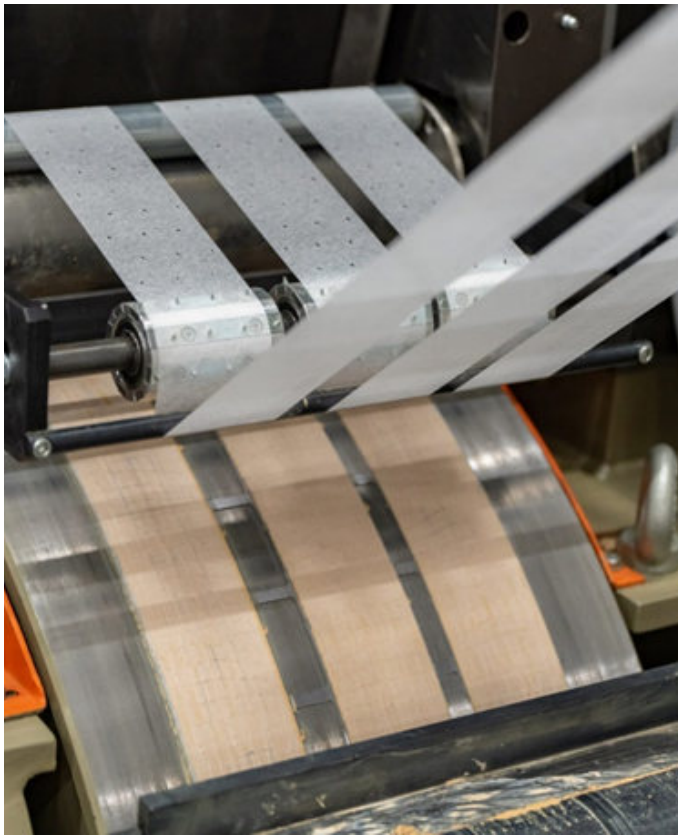
MANUFACTURING PROCESS

Building a grid

This is an important part of the battery because it holds up the active material and lets the electrons that are created during the electrochemical process move on. There are different kinds of grids based on how the battery will be used and how much work needs to be done: cast grid with a shell mold; continuously cast grid; grid made with expansion systems (rolled lead strip); punching systems (rolled lead strip); die-casting systems; and cast grid with a shell mold.

Industrial tools that are either semi-automatic or fully automatic can be used to build the grid that is needed to hold the active material in place. The grid casting machine is made for semi-automatic production. Expansion, continuous casting, or punching tools are used for automatic production.





Making the paste

The supporting squares must be wrapped in the right amount of active material for the plates to do their job. Because of this, it is important to make the right combination. During the pasting stage, the active material is put on the grid, which acts as a support and an electrical carrier, to make the plate, which is an important part of a lead-acid battery. To make the paste that will be put on the plates, the following things must be mixed in a certain way:

1. drinking water
2. acid that burns
3. Zinc oxide for the negative part
4. lead oxide for the important stuff
5. add-ons

The water that is used must not be too hard and not contain any heavy metals.

Pasting and Curing

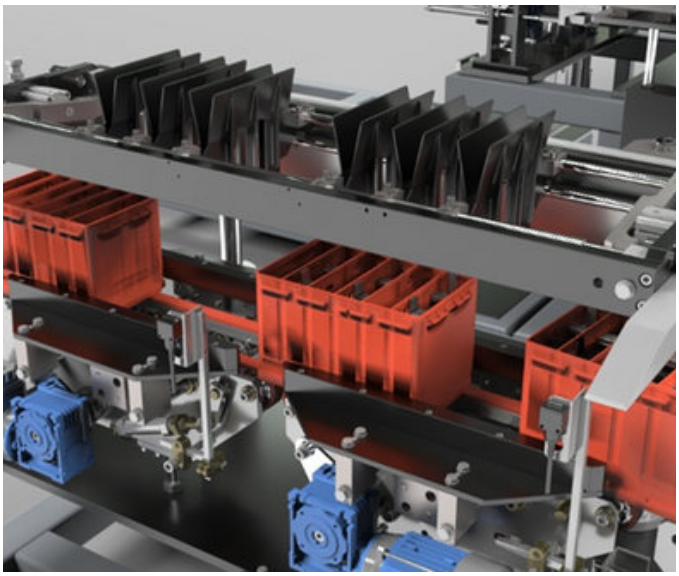
During this step, the system makes active material that covers the whole grid. In this step, tools that paste are used. Following this, the plates are put in a room with specific temperature and humidity conditions that help the sulfates crystallize. This gives the plates the right amount of hardness.

In the curing phase, the chemistry and solid structure of the different amorphous materials that make up the plate change, as well as their physical bond. This makes a plate that is ready to be used in making the battery.

Battery Assembly

The lid is welded to the container after it has been put on the battery. This leaves the terminal group contacts free to be welded to the cover. After this comes the pneumatic air escape test. If the battery was charged dry, it can now be put in the packing section. If it was charged wet, it can be put in the charging section. The plates that were cured or charged dry need to be put together into groups of plates and patterns of groups of plates. To do this, special machines with insulated plates are used to wrap the groups, and another machine joins the groups together until they are put into the container.

Before the groups are joined using the inter-cell welding method, it is made sure that there is perfect insulation between the positive and negative plates. Next, the lid is welded to the container. This leaves the terminal group contacts on the cover free to be welded. The battery is then put through a pneumatic air leak test.



Making formation

Now that the battery has the right amount of liquid, it will be charged according to its own set of instructions while its internal conditions (temperature and resistance) are being watched at the same time. The battery is then brought to the finish line by adding more electrolyte, putting the plugs in the right place, washing, neutralizing, and drying the outside case.

The rapid discharge and high-voltage tests are done after the drying step. After that, the battery's terminal poles are cleaned and greased. After this process is done, the item is finally ready for any kind of finishing that makes it look good.

Reference

Batteries Step by Step: The Lead-Acid Battery

SOVEMA: Equipment for Lead Acid Batteries.