

Johnson Controls Inc.

Project: The world's largest supplier of lead-acid batteries wanted to develop a system to stamp lead grid for its battery division.

Goal: Produce two grids simultaneously at a rate of 250 strokes per minute.

Results: Exceeded target output; increased the current collection and distribution characteristics of the grid while minimizing the grid weight.

Beloit Precision has been helping manufacturers with their precision stamping issues for more than 40 years. In that time, we have encountered numerous situations where we have been able to help our customers when unique problems or situations arose, to either correct a problem with the project or reduce costs and save the companies money.

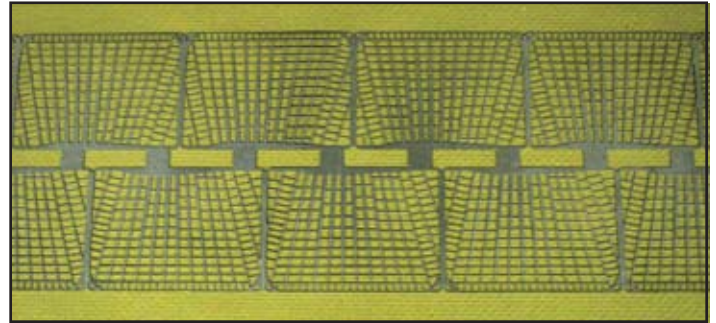
As the world's largest supplier of lead-acid batteries, Johnson Controls strives to deliver the highest battery performance available for passenger, commercial, agricultural and recreational applications. Johnson Controls wanted to develop a system to stamp lead grid that would be configured to optimize electrical performance, reduce weight and ensure long battery life. Johnson Controls' goal was to be able to produce two grids simultaneously at a rate of 250 strokes per minute.

Grids for lead-acid batteries provide structural support for the active material within the battery and serve as a current collector during discharge and current distributor during recharge of the battery. Battery grids are commonly manufactured by processes such as casting, expanded metal forming and stamping.

Attempts to optimize the current conducting capabilities while minimizing the weight of the grid have led to numerous grid designs. However, the disadvantages associated with different manufacturing methods have limited the ability to manufacture even a greater number of grid patterns that can offer increased conduction capabilities and reduced weight.

The plan called for a stamping press, feeder, tooling, scrap removal system and winding system. Initially, a manufacturer at another facility prototyped a processing tool, but with only limited success. It became clear that a fresh approach was required to meet Johnson Controls' specifications and launch date.

The contractor turned to Beloit Precision to develop the necessary tooling and a closed-loop production line for stamping the grid from continuous coils of lead material. Development for this intricate project occurred in phases over approximately three years.



The physical characteristics of lead posed challenges to the development of an efficient stamping process. For one thing, lead is a dirty metal and many fabricators avoid working with it. The metal's softness and malleability also make it difficult to stamp the lightweight grid patterns and maintain a minimum feeding rate of 125 feet per minute.

This is where Beloit Precision's expertise in material handling proved invaluable.

The tooling engineered by Beloit Precision create grids of superior quality, enabling Johnson Controls to reduce the amount of lead used to manufacture its batteries. This lowers both the weight and cost of the finished products. The actual stroke rate of 300-plus strokes per minute surpassed the original target 250 strokes per minute.

In the grid-manufacturing process, as much as 80 percent of the lead sheets ends up as scrap. The closed-loop system devised by Johnson Controls facilitates a continuous recycling of materials. Scrap lead is removed from the press to be melted down and formed into coiled stock. The coiled stock reenters the production stream for subsequent processing into grids.

Johnson Controls has implemented this manufacturing system at multiple facilities in the United States, Mexico and the United Kingdom.