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# The Burgeoning Battery Maintenance Micro Industry

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The manufacture of today's lead-acid batteries, particularly since the introduction of the cast-on-strap process, has resulted in the highest quality products ever for use in forklift trucks. Today's batteries are more consistently manufactured and are more reliable than those made in the past, which were made with less automated manufacturing processes.

Still, there's evidence that the biggest advances in battery performance in the last 10 to 20 years have come not from the batteries themselves, but from new battery maintenance practices. A micro industry has developed that offers a variety of tools available to battery room and warehouse managers, enabling them to extend the lives of their batteries and ensure the highest possible level of performance while increasing worker productivity and improving warehouse safety and compliance with OSHA regulations. As a result, managers responsible for their companies' forklift operations are increasingly touting the return on investment they achieve in their operations.

## Battery Watering: A Simple Job Done Poorly

There are a variety of tools geared toward helping to manage battery assets. Properly maintained, industrial batteries should provide five years of reliable power. But one of the simplest battery maintenance tasks is also one of the most poorly performed: battery watering.

Over-watering a battery can create "boil over," in which sulfuric acid is spilled onto the surface of the battery as well as the lift truck, floors, racks and, potentially, workers. This not only creates a damaging and hazardous condition within the warehouse, but also decreases the battery's useful life. Why? During a boil over, some of the sulfates are washed out of the battery and sulfates are needed to maintain the capacity of the battery. For every boil over, the battery loses approximately 3 percent of its capacity. Over time, boil overs can decrease the life of a battery by six months or more.

Under-watering is another common problem. Under-watering can happen when batteries aren't watered on schedule or when they are manually watered and the operator accidentally skips a cell. When a cell is skipped in a typical watering regimen, it might not get the water it needs for another week. That can result in permanent damage. When parts of the battery's positive and negative plates get dry, battery capacity is decreased. A condition called sulfation develops on the dry part of the plate and even when water is re-introduced to the dry cell, for example at the next scheduled watering, it will not return to its previous performance. In the worst case, a damaged cell would need to be replaced entirely, which is an expensive proposition.

The most common factor contributing to over- and under-watering is the hand-watering of batteries. An estimated 70 percent of industrial batteries are filled by hand, despite the fact that single point battery watering systems have been available for years. However, as managers push for greater warehouse efficiency in order to achieve corporate profitability goals, interest in, and sales of, single-point watering systems are on the rise.

Single-point systems offer a cost-effective and safe alternative to hand-watering. There are several such systems available and for the most part, they operate similarly. The first single-point systems were manufactured with floats that gauge the electrolyte level. In the early 1990s, Philadelphia Scientific pioneered a pressure-dependent watering system that uses water injectors that are snapped onto each battery cell and are connected to one another with corrosion-resistant plastic tubing. Each injector has its own level-sensing valve, which is powered by water pressure, ensuring precise sensing of electrolyte levels in each cell.

To fill the batteries, a hose is attached to the input fitting and a valve is opened. The water flows through the plastic tubing and, simultaneously, into each of the cells. Within 15 to 20 seconds, the battery is filled with each cell receiving the

precise amount of water needed.

Using a single-point watering system, batteries can be filled up to 20 times faster than by hand watering, increasing worker productivity and improving safety. In 2006, Philadelphia Scientific surveyed more than a dozen users of its single-point Water Injector System to determine the ROI those systems provided. ROI was determined by considering labor savings from the decreased time spent watering batteries; time saved due to less frequent battery changes during shifts; and savings from less frequent battery purchases as batteries experienced longer life spans with proper maintenance. Survey results revealed that in a typical 100-battery fleet, a company can expect to save approximately $26,000 per year with an ROI of approximately 13 months.

## Getting Organized

Battery room and warehouse managers can also more effectively manage their battery usage and the useful life of their forklift batteries, by organizing and sequencing the use of their batteries.

When a fork truck driver enters a battery room to get a replacement battery, how does he know which battery to take? Normally, chargers have a small light indicating that the battery connected to it had finished charging. But in most battery rooms, there are often several of these lights on at any one time. Which one does the driver pick? Usually, the nearest available battery. That means the batteries nearest the entrance get used more than those at the end of the room. Sometimes the ones at the end don't get used at all.


There are several battery organizing systems on the market that can eliminate the uncertainty of battery selection, increasing the useful life of the battery fleet. As an example, the iBOS system from Philadelphia Scientific works by determining precisely which fully charged battery is next in line for use by the truck driver. It does this by collecting charger data through electronic monitors. These monitors send data to a central controller, which then processes the data and sends a message to a scrolling LED display informing the forklift driver which battery to take. If the driver misunderstands or ignores the display's instruction and selects the wrong battery, a "Shouter" loudspeaker points out the error. The monitors can work with virtually any charger, including high-frequency types.

While battery organizing systems can range dramatically in complexity and cost, most will pay for themselves within two years and do so in two ways. First, they improve the efficiency of day-to-day operations. Such systems help by organizing the battery-changing operation, in real time, to ensure that all batteries are used in strict rotation, preventing battery abuse and related problems down the road.

Secondly, battery organizing systems improve corporate asset management by diagnosing problems. Many organizing systems collect an enormous amount of data from the chargers and some are designed to reduce the data to a compact executive summary report. Such a capability is extremely valuable for leasing companies, companies with multiple sites, companies operating during peak periods of seasonal activities or for any medium to large facility with a hectic schedule.

## Easy-to-Implement, Cost-Effective ROI

Warehouse and battery room managers are no different than any other business manager today; they are all looking for tools to help them run more efficiently and, where possible, demonstrate a healthy ROI to their direct reports. Battery maintenance has not been viewed as a key strategy in improving efficiency in the past. "Hey, they're just batteries," a manager might have said. But today's arsenal of battery maintenance tools can save large warehouse and distribution operations tens of thousands of dollars per year. Better battery maintenance may be one of the simplest and most cost-effective strategies a manager can implement to demonstrate an impressive ROI.

*Contact Philadelphia Scientific at www.phlsci.com.*

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