Lean Comes To The Industrial Battery Room

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More than 20 years after it first entered the manufacturing lexicon, Lean thinking is finally taking hold in the warehouse and DC. Now, the last frontier for Lean implementation may be the industrial battery room.

In its simplest form, Lean manufacturing means producing goods with less; it applies fewer resources without affecting the quality or quantity of the goods produced. The Toyota Production System, credited by many with initiating Lean manufacturing worldwide, promoted the elimination of waste and focused on seven sources of waste:

- **Overproduction**: manufacturing items before they are required.
- **Motion:** unnecessary motion caused by poor processes.
- **Waiting:** leaving goods in stasis before they are ready for the next process.
- **Transportation:** excessive movement and handling to get goods from one process to the next.
- **Over-processing:** effort that adds no value to the finished product.
- **Inventory:** excess material or equipment that ties up money that could be better used.
- **Defects**: allowing quality deficiencies that result in rework or scrap.

Eventually, an eighth source of waste was identified: People, not optimally using the knowledge and ability of people within the business.

Lean thinking has had a major impact on streamlining manufacturing processes

throughout the world. And its use in warehouses and DCs has achieved impressive results. But is Lean thinking needed in the battery room? Is Lean implementation even possible? And if so, is it worth spending the time, money, and resources to accomplish it?

Waste In The Battery Room

Battery room activities are seen as ancillary to the warehouse's main business of storing and distributing. But a poorly run battery room actually creates additional waste throughout the entire warehouse. In fact, six of the eight types of waste can be found in the typical battery room.

- **Transportation**: Unnecessary trips to the battery room to change batteries due to inadequate information on the charge state of the battery being used.
- **Inventory**: More batteries and chargers in the fleet than are needed for the required work.
- **Motion**: Battery changing and battery watering processes that require more movement than is necessary.
- **People**: Too many people watering and charging batteries, some with skills that could be best put to use elsewhere in the warehouse.
- **Waiting**: Operators queuing for battery changes due to poor charging practices, operators waiting during slow battery watering practices.
- **Defects**: Operator selection of the wrong battery, which can shorten battery life, costing money; too much or too little water added during battery watering, which shortens the battery life and may cause a hazardous condition due to electrolyte boil overs.

Waste in the battery room can cost large warehouses and DCs hundreds of thousands of dollars per year. Even small operations with as few as 10 to 20 forklift trucks can lose tens of thousands of dollars due to these wastes.

To achieve measurable and sustainable elimination of waste, managers need to focus on the three major impacts on battery room operation and maintenance: *Rotation*, *Right-sizing***,** and *Battery Watering*.

Rotation

The number one cause of reduced battery run time, reduced battery life, and waste in the battery room is improper battery rotation. This occurs when forklift operators make their own battery selections without proper direction as to the "correct" battery to take. Left to their own devices, operators will take the closest battery (in order to make the quickest change) or the newest battery (in hopes of getting the longest run-time).

The consequences of improper battery selection are costly. Site tests have shown that when battery selection is left to an operator, 30 percent of the batteries will be underutilized and 20 percent will be overused. The result: uneven battery usage, premature battery failure, and lost productivity.

The key to ensuring proper rotation—that is, selecting the battery that has had the longest cool-down time since charging—is to make picking the right battery simple and to measure performance for accountability.

Battery fleet management systems are the single most effective tool for ensuring proper battery rotation and, therefore, reducing waste in the battery room. For example, iBOS® (intelligent battery organizing system) from Philadelphia Scientific monitors all batteries in a pool and eliminates operator judgment in battery selection by identifying which battery has had the longest cooling time since charging. Once charged, each battery is placed in queue. The system's "read and react" display then tells the operator which battery to take.

Right-Sizing

Right-sizing a battery room offers significant potential cost savings by properly matching the size of the battery fleet to the operational needs of the forklift fleet. When a battery fleet contains too few batteries, battery assets are being over-utilized, reducing battery run time and battery life. When there are too many batteries in a fleet, unused assets are being wasted.

Determining the proper size battery fleet is a challenge without objective, accurate information. The Lean method for right-sizing a fleet requires ongoing operations feedback and measurement including battery availability at any given time (when there are more or fewer batteries than needed), the length of cool down time, and battery cycles per week.

When combined with the power and accessibility of the Internet, battery management systems are an ideal tool for right-sizing battery fleets. For example, users of iBOS can subscribe to a web service that enables managers to optimize assets by analyzing battery performance and creating performance reports remotely on the Internet. Most importantly, the reports can verify that a battery fleet is right-sized for the facility.

Battery Watering—Determining When To Water Batteries

Watering industrial batteries has been called "a simple job done poorly." In most warehouses, all batteries are watered on a set schedule, typically every week. Not only can this be a complicated procedure, but also a time waster, as many of the batteries don't need watering—and many needed watering far earlier, and costly, permanent damage may already have been done to the battery.

The original method of determining which batteries need watering—still used in some warehouses—is checking every battery every week. This is an extremely time-intensive activity, as personnel remove each vent cap and peer inside each cell to determine the electrolyte level.

The fastest way to determine when batteries need watering is with battery watering monitors, which attach to the top of each battery. Monitors allow watering on a labor-saving, "as-needed" basis instead of a hit-or-miss schedule. Battery watering monitors not only save money and improve productivity, but enhance warehouse safety by reducing employees' exposure to acid.

Watering Batteries Quickly And Precisely

The precise watering of batteries is critical to their proper maintenance and to their long run time and long life. Over-watering a battery can cause boil overs, creating a hazardous condition. It also decreases the battery's useful life because during a boil over, sulfates, which are needed to maintain capacity, are washed out of the battery. For every boil over, a battery loses approximately three percent of its capacity. Over time, boil overs can decrease the life of a battery by six months or more.

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 won't likely get the water it needs for another week—and when parts of the battery's positive and negative plates get dry, battery capacity is decreased. Even when water is re-introduced to the dry cell, it will not return to its previous performance. In the worst case, a battery may need to be replaced.

The most common factor contributing to over- and under-watering is the hand-watering of batteries. An estimated 70 percent of industrial batteries in North America are filled by hand. The best available solution is single-point watering systems. With their water injectors and precision level-sensing valves, these systems can water a battery in 15 seconds or less—a fraction of the time it takes to water a battery by hand.

The system saves money in two ways. First, it cuts labor costs, often paying for itself within its first year of operation. Second, it extends the life of each expensive battery it is installed on due to the improved accuracy of watering. In one survey, users of a single-point system in an average 100-battery fleet can expect to save approximately $26,000 per year with an ROI of about 13 months.

Single-point systems also improve safety and environmental cleanliness. There is no need to peer into cells to inspect levels as with manual filling, and water injectors automatically fill each cell to the correct level, preventing overfilling and electrolyte overflow during charging.

The Lean Battery Room

The warehouse and DC battery room is the last frontier for the implementation of Lean practices. Yet the Lean Battery Room can be immediately implemented with existing technologies and proper maintenance and operating practices. And the potential benefits are enormous, representing tens of thousands of dollars in savings from reduced waste even in small- to mid-sized battery rooms.

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