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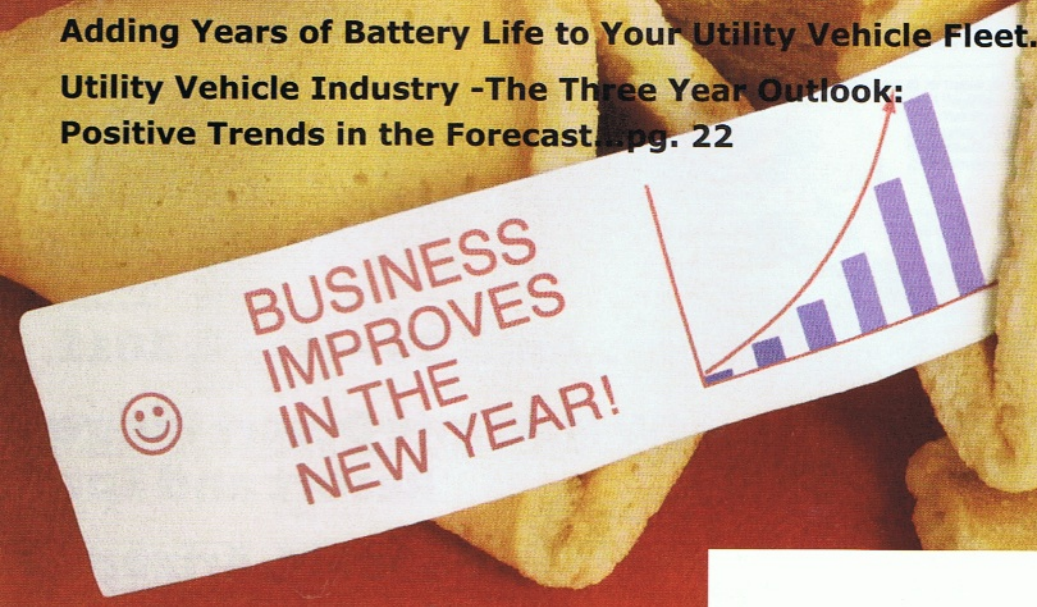


Regular Battery Maintenance Can Add Years of Life and Top Performance To Your Utility Vehicle & Mobile Equipment Fleet

By Robert "Smokey" White, Vice President of Sales and Marketing,
PulseTech Products Corporation

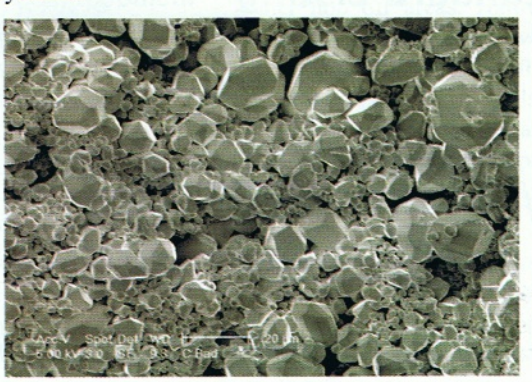
Taking battery performance for granted can be frustrating and ultimately costly for those whose responsibility centers on keeping equipment operational and work schedules on time.

No matter what type of industrial equipment you use—forklifts, pallet jacks, scrubbers, burnishers, scissor lifts, etc.— the battery system *gremlins*, lead-sulfate deposits on battery plates, systematically eat away at the battery causing reduced performance and life cycles leading to premature failure.

The result is breakdowns, time lost on the job and more year-to-year expenses for replacement batteries, literally costing businesses millions of dollars annually in batteries being sent to smelters and landfills years before their useful lifecycles are up - wasting natural resources and wasting budget line items.

The workhorse lead acid battery handles the lion's share of stored electrical power requirements in most of today's utility vehicle and mobile equipment fleets. This includes standard flooded as well as the newer sealed AGM types. As good as these batteries are they all suffer from the same main failure mode—80% of all lead acid batteries fail due to the damaging effects of sulfation build up. If left unmanaged, sulfates found in the electrolyte will crystallize and root onto the battery plates and eventually result in premature battery failure. This is especially true with seasonally used vehicles and vehicles with key off parasitic loads on the electrical system.

Pulse Technology®, developed and patented by PulseTech Products Corporation in 1989, has proven to be the "magic bullet" removing and preventing the buildup of damaging lead-sulfate deposits on battery plates in a non-harmful way, so a battery can accept, store and release maximum power all the time. It's battery life renewing applications are found in numerous maintenance and charging products and systems.



Microscopic View of Sulfated "Clogged" Battery Plate

Of course, there many factors that leads to sulfation and premature battery failure:

-- Battery self discharge
-- Key off parasitic drain
-- Insufficient run time
-- Corroded battery terminals and cables
-- Intermixing of un-matched batteries
-- Operator error
-- Faulty electrical systems
-- Physical damage

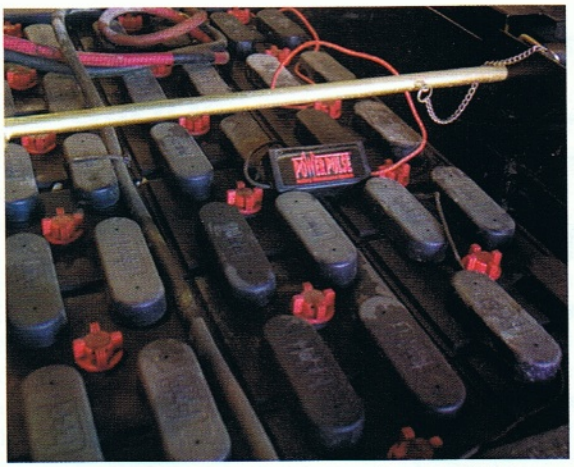
Through years of product development and customer evaluation, we've discovered that if used properly, battery testing, charging and maintenance products utilizing the patented Pulse Technology® can reduce a fleet's annual consumption by 70 percent or more.

While there is no single fix to battery maintenance, we've found that a good start is to permanently install a battery performance system, such as PulseTech's PowerPulse™, which is designed to consistently clean plates so the battery can charge faster and deeper.

Clean plates also mean there is less internal resistance and heat generated in the battery so it takes much less time to cool down after recharging and that batteries will maintain the maximum reserve capacity they were designed to hold. That means they will have more available power so your industrial equipment will last longer between recharges giving you the true power you need.

In a test case, the industrial 12-volt solar panel battery maintenance systems were installed on the trucks as well as a 24-volt PowerPulse on one of the pallet jacks to maintain two-year old batteries that were set to be replaced. The maintenance systems offset the parasitic drain and removed enough sulfation buildup to increase the condition of the batteries, and as a result, Cold Cranking Amps (CCA) on all the truck batteries was up, providing an easier start. The pallet jack usage time was also greatly extended between battery recharges, plus the clean battery once again accepted a full charge allowing for a full 8-hour shift usage. (See image next page).

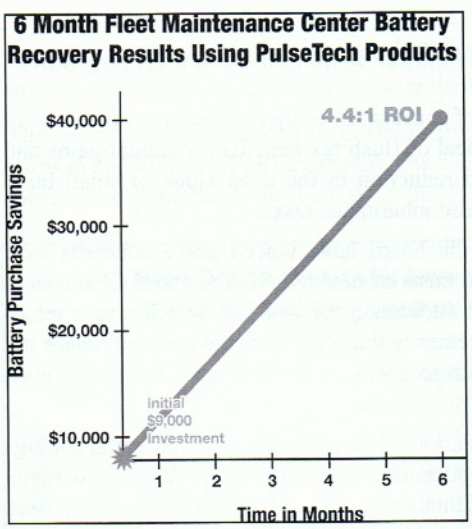
Fleet managers should also consider employing a series of high tech smart tools, including analytical testers and charging systems, stock maintainers, heavy duty rolling multiple battery char



Forklift with PowerPulse Installed for Desulfation and Maintenance

gers for seriously under-maintained batteries. Recommended is a scheduled routine "cradle to the grave" maintenance program that clearly defines procedures in handling and safety, preventative and corrective maintenance, testing and diagnostics, charging and ultimately battery replacement.

In one recent fleet maintenance case study, a client spent $9,000 on the purchase of multi-station conditioning chargers, maintainers and battery testers to run diagnostics and maintenance on 616 batteries that were thought unusable. Through PulseTech's program 359 of those batteries were recovered and kept in service, representing a cost savings of just over $40,000.



Several years ago, we collaborated with the military to create a Battery Manager Maintenance Program (BMMP), which incorporates our "smart" charger and conditioning and maintenance technology along with strong service and support.

LTC Anthony W. Adams, who serves as the Surface Maintenance Manager (SMM) for the Kentucky Army National Guard (KYARNG) instituted the BMMP a few years ago covering a wide variety of tracked and wheeled equipment including Multiple Launch Rocket Systems (MLRS), Howitzers, Armored Personnel Carriers, Engineer Equipment (bulldozers, scrapers, dump trucks, front end loaders), Heavy Equipment Transporters, Palletized Load Systems, Heavy Expanded Mobility Trucks and High Mobility Purpose Wheel Vehicles.

With approximately 3,500 vehicles, trailers and generators, LTC Adams learned that crafting a maintenance plan that met his unique blend of battery service and maintenance equipment, battery inventory and vehicle usage was best met with a solid plan using the right equipment.

So for a fleet, the process works like this:

When new batteries arrive they are placed on a fully automatic 12-station charger (SC-12) that desulfates the plates and brings the batteries to a new state of charge. Then they are ready for use. Twelve batteries are kept charged at all times. When one is used, it is immediately replaced with another.

When a vehicle is brought into the shop, the batteries are tested to ensure they are holding a charge within 0.2 volts of each other. Using an electronic battery tester this can be done in under a minute. The SC-12 again returns the batteries to a like new state without having to remove the batteries from the vehicle. Once the batteries are charged they are again checked; this time for full serviceability with the advanced battery analyzer. If a battery does not test to standard, it is replaced. That battery then starts the process over.

The results are that technicians are spending less time working with batteries, resulting in an indirect cost savings in more productivity to perform mechanical work (troubleshooting and repairs). Also as a direct result are hard cost savings in money spent not being spent on replacement batteries.

A battery maintenance program is not a case of one procedure or set of products fitting all but utilizing certain products based on types equipment, functionality and work schedule demands.

While warehouse utility and industrial equipment might require one type of systematic approach, vehicles and equipment in the field might consider another "on-board" type of preventative maintenance program.

As an example, using the restorative power of the sun in partnership with a solar battery maintenance system has proved to work well in many commercial and military fleet applications.

Anytime the sun is shining these durable, weatherproof solar-based products apply a constant charge combined with a high frequency pulse technology, to maintain and condition vehicle or equipment batteries while in use or while sitting idle.

In conclusion, it has been proven—time and time again—that regular maintenance can help equipment perform stronger and longer, even extending battery cycle life spans up to three times. And time always equates to money—either lost or gained.

To read more about PulseTech Products Corporation go to www.xtremecharge.com. PulseTech offers a full line of products that will help protect the environment from the hazards of lead waste from discarded lead-acid batteries.

About the Author: Robert "Smokey" White is the Vice President of Sales and Marketing for PulseTech Products Corporation. White has more than 25 years of sales, product development and marketing experience in the automotive, heavy-duty, marine, power sports aftermarket and various OE segments, specializing in battery technologies and products.

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