

## **The Technological Leap of Pulse Technology**

Along with all of the benefits that the invention of the lead acid battery has brought to the motoring public, comes the problems as well.

Battery problems and failure have plagued vehicle owners since its invention more than 100 years ago. Batteries are installed and used until thought to be “dead”. Then in most cases, they are replaced long before their potential life has been realized. Nothing could be done about this because the unpredictability inherent with common use of the battery within any vehicle’s given environment was in control. But in 1995, a new technology was developed and patented that I believe revolutionized battery maintenance and charging methods. As you will read, the application of this technology is kind of like “giving your battery vitamins” to keep it healthy.

The impact is especially important for seasonally used vehicles utilizing 12-volt lead acid batteries such as RVs, Motorcycles, ATVs, Lawn and Garden Tractors, etc., but all conventional flooded, lead-acid and sealed maintenance-free batteries including Valve Regulated Lead-Acid (VRLA), Absorbed Glass Mat (AGM) and gel cell batteries benefit from the technology.

Ever wonder why a battery “dies”? The interaction of a sulfuric acid with the surface area of the lead plates is at the heart of a batteries ability to create, store and release energy. Basically, a battery is able to store and supply energy if enough of the active plate material is available to allow an energy transfer to occur naturally. In theory, batteries should last many years, but they usually don’t because of a series of detrimental problems caused by “excessive sulfation buildup” related to the natural and necessary formation of sulfate crystals on the surface of lead battery plates.

As a battery ages through use or sits unused for periods of time, these lead sulfate crystals enlarge and can build up “excessively” to the point where they create a physical barrier across the plate. Before long, this buildup can become so dense that a battery will no longer accept or release energy.

When questions are posed to the right people, answers will come. What if this excessive buildup could be significantly reduced or eliminated? Would that dramatically extend a battery’s life? This was the dilemma posed to PulseTech Products Corporation engineers 12 years ago. After a lot of research and development, company engineers developed a way to combat this and patented it – Pulse Technology is born.

What makes this technology so unique and effective is a distinct pulse waveform. This waveform has a strictly-controlled rise time, pulse-width, frequency and amplitude of current and voltage pulse. No other known battery charging or maintenance system has these specific characteristics. Pulse Technology prevents the buildup of damaging lead-sulfate deposits on battery plates safely, so a battery can accept, store and release maximum power all the time.

Studies by major universities were conducted in response to a request from the military, scientific and engineering communities for scientific validation of claims that pulse technology actually improves battery efficiency and lengthens battery life. PulseTech contracted with Oakland University in Rochester, Michigan and Ohio State University in Columbus, Ohio to conduct separate evaluations of the technology. These extensive evaluations began in the summer of 1998 and concluded in the Fall of 2000.

During these studies, these crystalline buildups were regularly investigated by X-ray diffraction methods. The X-ray diffraction data confirmed the positive effects of the application of this patented Pulse Technology on the battery plate morphology. It shows a more even distribution of lead sulfate crystals over the surface area of the battery plates. It also revealed a significant reduction in the size of the lead-sulfate crystals. These microscopic changes, kind of an electro-mechanical stirring or cleaning action on the plate surface, greatly improve a battery's ability to accept and store more energy.

During the Oakland University study, testing was also done on stored batteries to determine how this patented Pulse Technology would affect military vehicles that sit unused for long periods of time. The batteries were stored at a constant temperature of 25°C (77°F) for 14 weeks.

The final report lists the following results: "There is a distinctive difference in the charge capacity between these two batteries. A battery stored under the influence of pulsation (Pulse Technology) retained its original capacity while the capacity of the battery stored without pulsation lost a considerable amount of charge. The decrease of charge capacity of batteries stored without pulsation decreased in a linear fashion with time. After 14 weeks the decrease of charge capacity accounted for about 25% of the battery's original capacity. In this same period of time, the charge of the battery attached to a product using pulse technology slightly increased. This is probably due to a reconditioning (reforming) process of the battery plates by the application of Pulse Technology or continuous pulsation.

Electron scanning microscopy as well as x-ray spectroscopy clearly underline reasons for the preservation process. During the storage of a battery without pulsation, a formation of large crystallographic domains is observed on the surface of positive electrodes. This is in contrast to the morphology of the battery stored with pulses. A smooth, homogeneous surface with significantly smaller crystals was formed during the storage process due to the pulsation effect."

Will routine pulse maintenance benefit other electrical components on my vehicle?

Yes. By maintaining your batteries in peak conditions, your alternator does not have to work as hard at recharging your vehicle's battery once it has started. The battery will accept a charge more eagerly and more quickly so alternator life should be extended. Plus, by maintaining available cranking amps in your battery, there will be more available energy going to your starter. The engine will turn over faster, so your starter should last longer as well.

Will weather affect my battery?

Yes. What many people don't realize is that extreme cases of heat and cold will increase the speed of discharge and sulfation buildup within a battery. For example, when the weather starts to get hotter, the rate of sulfation buildup will actually double for every 10-degree increase in temperature. That means that if the temperature goes from 75° to 95°, sulfation buildup will occur 300% faster than normal.

When it's cold outside, sulfation buildup in combination with the slow down of the chemical reaction within the battery will rob operational power needed as vehicle fluids thicken. This cold condition caused even more power to be taken from the battery to start the vehicle, so the battery has to work harder than normal to provide additional power needed and a result realizes a further reduction in voltage causing faster buildup of sulfates on the lead plates. Also, keep in mind that the battery's electrolyte can actually

freeze if the battery is in an advanced state of discharge, and this could damage the lead plates. At 1.270 specific gravity (100% charged) battery acid will freeze at -83°F, at 1.200 it will freeze at -17°F and at 1.140 (completely discharged) it will freeze at only 8°F.

Is it possible to recover a dead battery that will no longer accept a charge?

Although our products are designed for keeping good, new batteries in peak condition for a longer period of time, some of them can, be used to bring batteries that will not accept and hold a charge back to useful condition.

Here's what you do: Use a Battery Analyzer to determine if the battery is a good candidate for recovery (Note: Even though the analyzer may read "REPLACE BATTERY," it could still be recoverable.) Then use a recommended charger with the pulse technology maintenance system to clean, re-charge and recover. Keep in mind that some very badly sulfated battery plates could take several days to clean. Also, not all batteries can be totally recovered. If a battery has a short circuit or physical damage, it is impossible to bring back.

The patented pulse has been proven to minimize, and in many cases actually reduce the size of these crystals, using a unique ion-transfer process, which greatly increases the life of any 12-volt battery.

By helping keep plates clean, the battery works harder than ever thought possible. It maintains a greater reserve capacity, will recharge faster and release more of its stored energy. With more available energy, the vehicle output lasts up to three times as long between charges, and electronic accessories work better. Pulse Technology helps access the true power potential of a battery.

This is important because there are many applications for Pulse Technology products in the power sports and "toy" hauler industries, including products being installed as OE on vehicles, as add-on sales at retail locations, used as a performed maintenance service in the service department or as a value-added service offering at storage facilities.

The development and commercialization of this product represents a true departure from the "old ways" to charge and maintain vehicle batteries and is the next generation in product development. With the many additional battery drains caused by the use of "creature comforts" in the vehicles of today, this battery maintenance and charging technology has more consumer need and real value than ever before.

For more information about Pulse Technology and products that use it, call (800) 580-7554 or go to [www.pulsetech.net](http://www.pulsetech.net).