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- **Energy Storage/Standby**
Lead – The most efficient technology
- **Motive Power**
Lead – The best overall solution
- **Hybrid Electric Vehicles (HEV)**
Lead is getting lighter
- **Safety and Reliability**
Lead – A longer track record in safety and reliability than other rechargeable battery technologies
- **Sustainability/Recycling**
Lead – One of the highest recycling rates on the planet

Informational Sources:

¹ Estimated from U.S. Geological Survey, Mineral Commodity Summaries, January 2009 (2008 production and consumption data) and ILZSG Lead and Zinc Statistics (2007 and 2008 data)
² Based on North America Lift Truck Manufacturing information www.indtrk.org

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Motive Power

Lead – The best overall power solution

With a dependable supply line, mature manufacturing and long cycle life, lead technology is the most cost effective and practical battery storage solution in the motive power industry.

Lead-Based Technology Delivers the Lowest Cost Per Unit

An established infrastructure of lead mining, mature manufacturing and recycling has made lead one of the most stable and cost effective energy storage technologies. Lead technology provides the lowest cost of energy and power output per kilowatt-hour.

The availability of lead provides a lower cost to the motive power market.

Well-established and stable mining, plus years of perfecting the recycling process, has created a dependable supply source that buffers fluctuations in raw material costs. Lead recycling is encouraged through recyclers who pay for the opportunity to obtain used batteries. Lead recycling is not tax subsidized, so there are no additional unexpected taxes associated with the end of life for lead batteries. In fact, 75% of the lead used in manufacturing new lead batteries comes from recycling.¹

Alternative technologies that don't have well-established supply sources are prone to raw material cost fluctuations that could significantly increase their costs to manufacturers and consumers.



Battery Council™
 International



New advances are helping to secure the future for lead technology. You won't find a battery chemistry that's safer, more abuse tolerant, more dependable, more recyclable, and available as the lead battery product.

The maturity of motive power battery manufacturing and the resiliency of the technology provides a significant advantage in optimizing cost efficiency.

With almost 65% of the forklifts manufactured today powered by lead batteries, it's not hard to see that lead-based technology is very compatible with today's motive power needs.² One of the main reasons lead products are so widely used is cost efficiency. A highly developed and mature manufacturing process brings "economies of scale" to its mass production. Years of advancing manufacturing equipment to deliver higher production rates continue to optimize the cost savings.

Another reason for lead's widespread use in motive power applications is its higher resilience to difficult environments. Conditions like dirt, chemicals, and vibration are commonplace in the motive power industry. Stressful applications like coal mining cars, navy ships, and below zero freezers are perfect examples of situations that would severely hinder a less hardy energy storage source. For many decades, lead batteries have provided dependable performance in the toughest of environments, lowering battery replacement costs or extra maintenance.

Predictable and inexpensive maintenance and replacement costs plus efficient charging systems have helped reduce the total cost of ownership.

Budgeting for lead battery costs is simple, predictable, and consistent. Replacement costs for lead batteries are usually easy to predict from long trends of documented use. Maintenance cost analysis is also very reliable in light of lead battery's proven track record of dependability and life cycle optimization. The actual costs of maintenance of lead batteries can be monitored and improved with inexpensive technology, further reducing the total cost of ownership.

Charging technologies for lead batteries have advanced and can be up to 90% plus energy efficient, with power factors approaching 99%. This helps keep utility costs low. Technical innovations in charging strategies like fast and opportunity charging, which charges the battery during operator downtime, add to the cost efficiency of the lead battery product.

Lead-based energy storage has more value per energy and power output than alternative battery technologies.

With features such as low cost per kilowatt hour, long cycle life, and required counterbalancing weight, lead batteries dominate the industry as a battery source. These factors illustrate that lead batteries are the commercially viable solution for motive power equipment. As future advances maximize the lead battery's energy density, its value continues to grow.

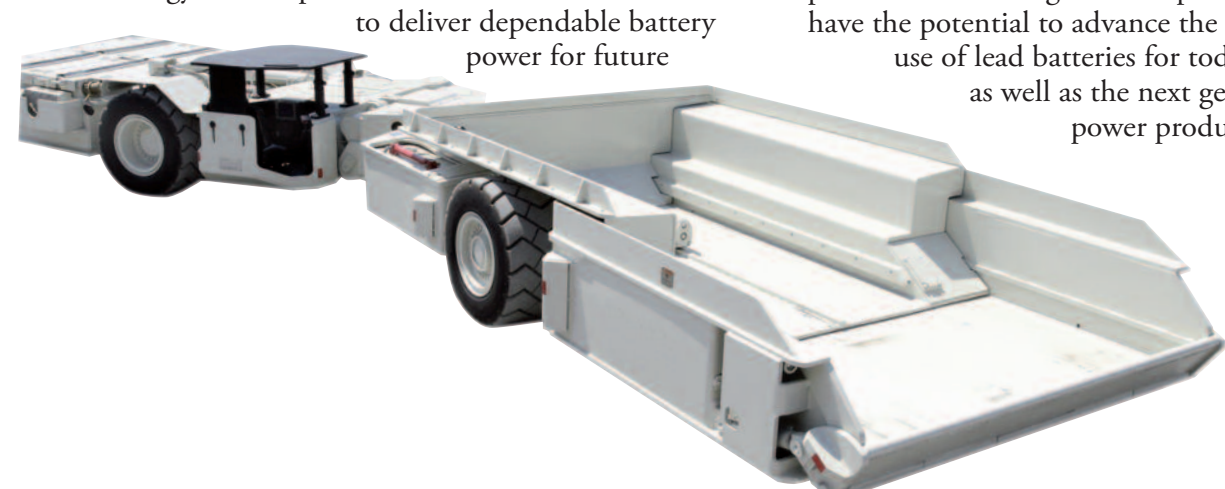
The Evolution of Lead Battery Products

Lead has a long history of success and continues to experience steady technological advancement. As the technology continues to grow, motive power applications benefit even more from its dependable and cost effective use.

A steady progression of advances with lead technology has occurred over the past 150 years. In that time, the expertise and experience with ways of using this technology have been notable. No other battery chemistry has powered the motive power industry in such a widespread capacity as proven, dependable lead. Many alternative battery chemistries have not been around long enough to go through a single lifespan as a commercially used product. Much of the life data is forecast, and only time will tell if these predictions hold true. Lead has a century and a half of proven use, and battery life only gets better.

For more than 150 years, the lead battery industry has served consumers with an ever-growing list of new and improved products.

The use and service of lead technology has experienced a steady progression of development and change. For each new application demand, lead technology has evolved. As needs continue to change and grow, lead technology will adapt and advance



to deliver dependable battery power for future

motive power applications.

Advances in lead battery innovation include the development of batteries requiring less maintenance. When properly specified, these batteries require less watering, significantly reducing costs and labor. Additionally, advances in sealed valve-regulated lead technology have provided a maintenance-free battery solution for motive power medium- to light-duty applications.

New charging technologies have made lead battery use more efficient in certain applications.

Technical innovations in charging strategies like fast charging and opportunity charging can supply higher rates to reduce the amount of time to recharge a motive power battery. This means the battery can be charged while it is in the vehicle in the work area. This means reduced extra battery cost, saved time, and increased overall charging efficiency.

Lead is moving right into the next generation of new motive power battery innovation.

Newly developed, advanced lead technology has the ability to provide and absorb charge rapidly, making it ideal for motive power applications which operate at a partial state of charge. Developments in this technology have the potential to advance the use of lead batteries for today's applications as well as the next generation of motive power products.