

# ***SUSTAINABILITY & SAFETY***

**BYD'S FULLY INTEGRATED IRON PHOSPHATE POWERED FORKLIFTS**



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**MODERNGROUP.COM/BYD**

# ***NOT ALL ALTERNATIVE FORKLIFT BATTERY CHEMISTRIES ARE CREATED EQUAL.***

Although the iron phosphate chemistry (LiFePO<sub>4</sub>) is categorized under the lithium family of chemistries, its unique chemistry properties differentiate the BYD iron phosphate battery from other Li-ion batteries. Here are some of those critical differences:

- Lithium Ion batteries contain cobalt (very harmful and toxic to the environment). NO COBALT in our iron phosphate
- No lithium ion will last as long as our iron phosphate
- Our iron phosphate will maintain constant voltage of 3.2V during discharge until each cell is fully exhausted (this allows the cells to deliver full power until they are fully discharged), Not Lithium
- Iron phosphate has a slower rate of capacity loss (battery lasts longer)
- Our Iron Phosphate is thermal and chemically stable (no heat- which can lead to smoking, fire or combustion). This is a big problem with the competitors' lithium products.



## ***A TRUE SOLUTION***

Sustainability and safety are two very significant and important words in today's modern-day business culture. Almost all companies today have at least started to develop a vision and set goals focusing around their sustainability and safety efforts. Corporate leaders understand why these two points continue to gain more attention year after year because they are continuously evolving. With the evolution of sustainability and safety in the workplace, corporate leaders are looking for ways to find the best and most innovative practices to be more socially responsible.



Although it's rare to see sustainability and safety being used together (*especially when referring to the material handling industry*), there is a layer of sustainability and safety that has not been previously introduced before now. Thankfully there's BYD, a company that embodies sustainability and safety as its core principal for innovation. For BYD and their material handling equipment, sustainability and safety couldn't be more connected.

## ***IN THE BEGINNING***

At the core of every electric forklift, there needs to be a power source. Something that provides the energy and power needed by the forklift to perform its daily routine of moving materials and products, acting as a necessary link throughout the

manufacturing process. The first rechargeable lead acid battery made for commercial use was invented in the late 1800s by a French physician named Gaston Plante. Although many hundreds of years have passed, today lead acid batteries continue to be used in a wide array of applications with very few changes.

Since the introduction of the electric forklift, conventional lead acid batteries have been the primary power source. A typical lead acid battery is designed to perform 1,500 cycles throughout its life span, charging the battery once a day for a year (*we will use 300 days taking in account for downtime*), should last around five (5) years ( $300 \text{ days} \times 5 \text{ years} = 1,500 \text{ cycles}$ ).

It is important to note that everyday factors (*opportunity charging, short- charging, battery temperature above 77 degrees, running the battery below 30% depth of discharge, etc.*) can dramatically reduce the battery's overall life span up to 50%, meaning that you could see as little as a 2.5 year lifespan from your battery.

Along with lead acid batteries requiring daily attention, they also have their share of other limitations:

- Continuous maintenance (watering, washing and equalize charging)
- Slow Charging (8-16 hours)
- Cooling after charging (8 hours is suggested)
- Proper ventilation in charging area
- Reduced battery life due to deep cycling
- Must be stored in charged condition to prevent sulfation
- Multiple shifts require multiple batteries (requires battery swapping)
- Not environmentally friendly

# ***LEAD ACID'S ENVIRONMENTAL IMPACT***

Lead acid batteries contain sulphuric acid and large amounts of lead. Lead is a highly toxic metal that can enter the body by inhalation of lead dust or ingestion when touching the mouth with lead-contaminated hands. If leaked onto the ground, acid and lead particles contaminate the soil and become airborne when dry.



Exposure to lead's toxicity produces a wide range of adverse health effects including: memory loss, kidney damage, loss of hearing, high blood pressure and reproductive system damage. The sulphuric acid is extremely corrosive along with being known as a carrier for soluble lead and lead particulates. Contact with the eye can cause permanent blindness, while ingesting even small amounts of sulphuric acid, damages internal organs that can lead to death.

Although up to 90% of lead acid batteries are recycled, the recycling process is regarded as one of the worst polluting industries around the world.

## ***ENTER BYD***

BYD, a global company lead by CEO Wang Chuan-Fu was determined to create a company that designed and manufactured new innovative products that are powered with renewable/clean energy.



Chuan-Fu's determination and dedication to help solve environmental problems quickly caught the attention of Warren Buffet and his Berkshire-Hathaway Company. Buffet was sold on Chuan-Fu's vision and made a \$230 million dollar investment for 10% ownership in BYD (*Buffet originally wanted to purchase 25% of BYD, but Chuan-Fu politely declined*).

Since Buffet became part of BYD, there has been no looking back. To date, BYD is the world's largest producer of electric vehicles, a title they have held consecutively for the last three years. Most recently, BYD became the largest electric bus manufacturer in 2017.

## ***BYD INTRODUCES ITS MARKET-DISRUPTING FORKLIFT***

Rather than relying on lead acid, a dated technology with many limitations, safety risks and heavy environmental impacts, BYD developed and uses an iron



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phosphate chemistry in their forklift batteries (*this same battery is used by BYD to power all their electric vehicles and buses*). The iron phosphate battery offers many advantages over the conventional lead acid battery such as:

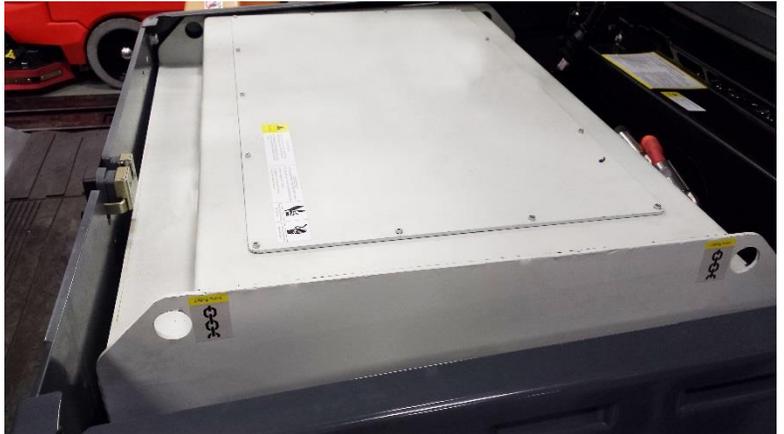
- ZERO maintenance (no watering, no washing, no equalize charges)
- Never requires cooling
- Increased performance (longer run times up to 18 hours)
- No ventilation required (no gassing when charging)
- Full charge in 90 minutes
- Fast charging and opportunity charging have zero negative effects on lifespan or overall health of battery (never worry about cycles again)
- One battery handles multiple shifts (NO battery swapping)

Although the iron phosphate chemistry (LiFePO<sub>4</sub>) is categorized under the lithium family of chemistries, its unique chemistry properties differentiate the BYD battery from other Li-ion batteries. Here are some of those differences:

- No cobalt (very harmful and toxic to the environment)
- Longer life cycle than other Li-ion battery chemistries
- Constant voltage of 3.2V during discharge until each cell is fully exhausted (this allows the cells to deliver full power until they are fully discharged)
- Slow rate of capacity loss (battery lasts longer)
- Thermal and chemical stability (no heat- which can lead to smoking, fire or combustion)

## ***BYD'S SUSTAINABILITY APPROACH***

BYD is a company that embodies sustainability and safety as its core principal for innovation. BYD's CEO, Wang Chuan-Fu, insists on making sustainability meaningful in every innovation that BYD is behind.



To that end, BYD's iron phosphate battery has a life span of 10+ years (*backed up by a FULL battery replacement warranty – see below*), is 100% recyclable (*uses a nontoxic electrolyte fluid*) and very stable. Its stability allows discharging at a constant rate while also allowing fast charging. Meaning your BYD forklift(s) will use fewer kWh per hour both while operating and charging (*consuming less energy is not only good for the environment, but it also saves your company money*). BYD is on top of its game by being a leader in clean technologies and is constantly looking for ways to produce more energy while emitting less carbon dioxide.

## ***MAKING SAFETY A PRIORITY***

After reading this article, you can see that by operating a BYD forklift your employees will never again worry about the possibility of a being involved in a safety related accident resulting from lead acid batteries. They will also



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breathe easier knowing that they will never be exposed to toxic materials or chemicals from a BYD forklift and its battery. Operating a BYD forklift (*or a fleet of BYD forklifts*) does significantly more than just reduce risk and eliminate daily battery maintenance headaches, it provides you with piece of mind knowing that the forklift battery requires zero attention in order to keep running with exceptional performance (*it's what they are made for*). It is also important to note that BYD's battery chemistry makes it the safest choice available on the market today. The BYD iron phosphate battery also passes every international standard available for battery safety testing. This accomplishment is unmatched by any other battery manufacturer today.

## ***COST SAVINGS***

Although the focus of this article is sustainability and safety in the material handling industry, it is worthwhile noting that owning a BYD forklift (*or a fleet of BYD forklifts*) will save your company time and money. BYD ensures your bottom line will be better off with reduced operating costs on the floor and in the board room. Consider these points:

- Reduced Risk - insurance premiums will be reduced over time
- Eliminate battery maintenance rooms and supporting equipment to manage lead acid batteries
- No more expensive non-producing square footage
- Never buy a replacement battery again – remove that cost from your operating budget once and for all
- Reduce your fleet size because BYD's forklifts are multi-shift capable and do not sit idle
- Owning a BYD forklift gives your company the power to control costs that were never controllable before



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- Owning a BYD forklift will decrease costs, increase revenue and deliver a higher quality product handling without increasing costs to the customer

## ***BEST WARRANTY***

BYD has proven its technology and its performance all over the world. BYD's batteries are guaranteed to have a remaining capacity of 65% or greater after 10 years or 20,000 hours, whichever comes first. BYD's restriction-free opportunity charging will **never** harm the battery.

The warranty is simple, no fine print, hassle-free and no hidden disqualifications. It is hands down the best warranty in the industry.

BYD has a proven sustainable, safe cost-savings solution for the material handling industry!

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