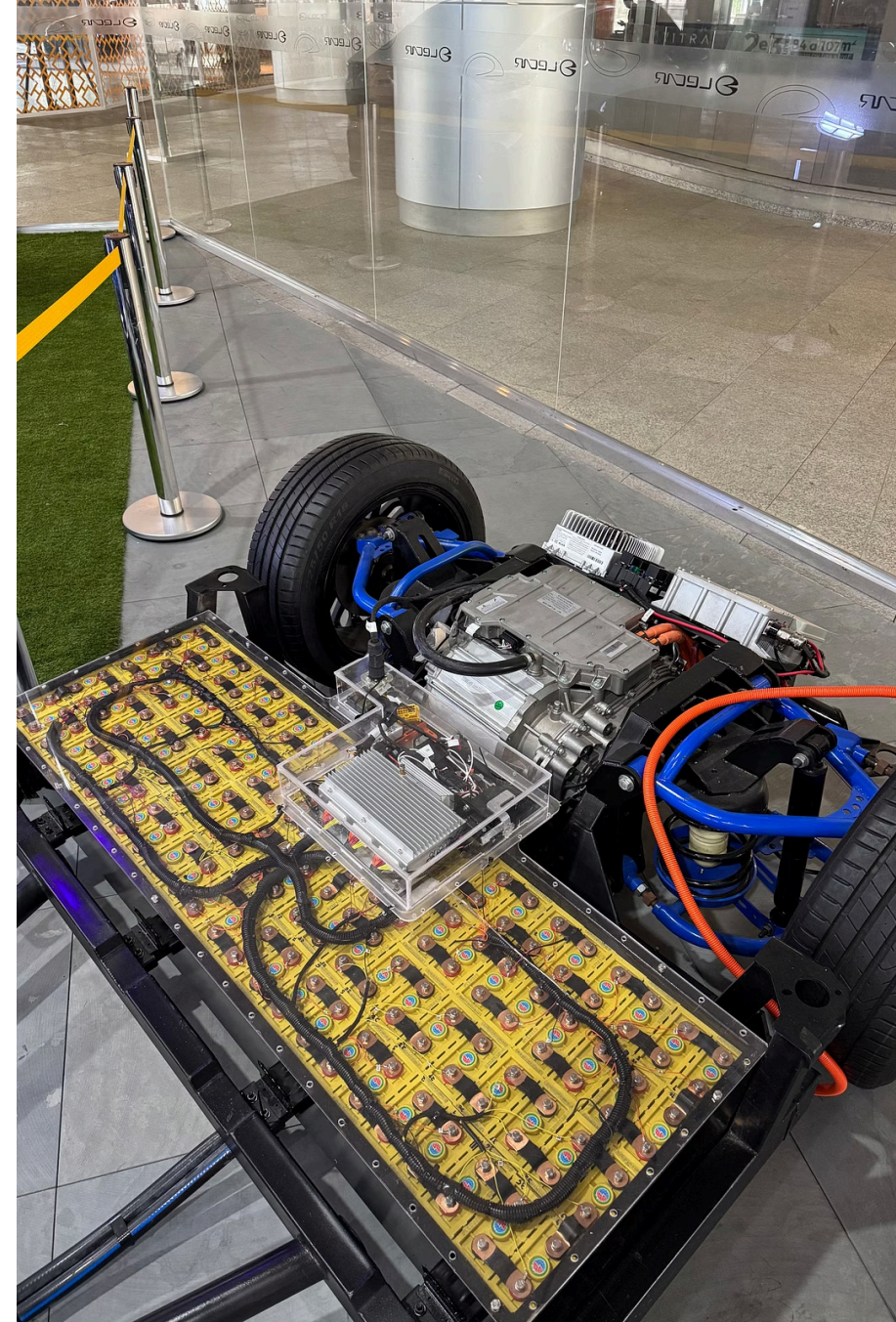


# Transportation and Power Systems

## Ultra-Safe High-Power LYP Battery Platform

Provides ultra-safe, high-power next-generation lithium battery solutions for transportation and power systems, meeting zero-tolerance requirements under extreme working conditions.

**Winston** Battery



# Industry Trends and Challenges

As global electrification accelerates, transportation and power systems are facing unprecedented technical challenges. Traditional energy systems can no longer meet the stringent requirements of modern equipment for high performance and high safety.



## Accelerated Electrification

The penetration rate of new energy vehicles continues to rise globally, and the electrification of industrial equipment is imminent.



## High Safety Requirements

Zero-tolerance standards have become industry consensus; any safety hazard can lead to significant losses.



## Instantaneous Power Demand

Scenarios like start-stop and acceleration require batteries to deliver large current outputs with millisecond-level response.



## Extreme Environment Operation

From extreme cold to scorching heat, from plateaus to oceans, equipment must operate stably under various harsh conditions.



## Long-term Operation and Maintenance Requirements

Commercial equipment requires ultra-long service life and extremely low maintenance costs to ensure economic viability.

# Transportation and Power's "High-Risk Pain Points"

In practical application scenarios, battery systems need to cope with various extreme working conditions. These challenges not only test the performance limits of batteries but also directly relate to the reliability and safety of equipment.



## Frequent Start-Stop

In urban conditions, vehicles may start and stop hundreds of times a day, placing stringent demands on the battery's instantaneous output capability. Traditional batteries often degrade rapidly in this scenario.



## Difficult Cold Start

In low-temperature environments, battery internal resistance rises sharply, leading to difficult or even impossible starts, severely impacting winter operations in northern regions.



## High Current Surges

Instantaneous power demand can reach 3–5 times the rated power. Continuous high current surges accelerate battery aging and can trigger safety hazards.



## High/Low Temperature Environments

Operating temperature ranges from  $-40^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$ , with large and prolonged temperature fluctuations, posing significant challenges to battery thermal management systems.



## High Vibration, High Humidity

Harsh road conditions and operating environments lead to continuous vibration. High humidity and high salt environments in coastal and mining areas accelerate battery corrosion and structural failure.



# Problems with Traditional Batteries in Power Applications



Traditional lithium battery technology has exposed numerous fatal flaws in transportation and power applications. These issues not only affect equipment performance but also bring serious potential safety risks and high maintenance costs.

## Voltage Drop

Voltage plummets during high-current discharge, leading to insufficient power, performance degradation, or even unexpected shutdowns.

## Low Temperature Attenuation

Capacity loss can reach 30%–50% below 0°C, making it almost impossible to use normally in northern winters.

## Thermal Runaway Risk

Organic electrolytes are prone to thermal runaway during high temperatures, overcharging, or collisions, leading to fires or even explosions.

## High-Rate Instability

Heat generation increases sharply and efficiency plummets during discharge above 2C; long-term high-rate use rapidly reduces lifespan.

## High Maintenance Costs

Short cycle life (typically <2000 cycles) requires frequent replacement, coupled with complex thermal management systems, resulting in high total cost of ownership.

# LYP Technology Architecture and Advantages

Winston Battery LYP batteries adopt a unique aqueous electrolyte system and lithium iron phosphate cathode technology, fundamentally solving the safety hazards of traditional batteries. Its innovative plastic casing structure design and advanced electrochemical system provide a revolutionary solution for transportation and power systems.



## Aqueous Binder System

Uses an aqueous binder instead of flammable organic solvents, fundamentally eliminating fire risks from the material itself, preventing fire or explosion even under extreme abuse conditions.



## High-Rate Discharge Capability

Supports continuous 3C discharge with stable voltage, instantaneous discharge up to 10C, perfectly meeting the demands for frequent starts/stops and high-power pulses.



## Ultra-Long Cycle Life

Cycle life exceeds 6000 times (80% DOD), calendar life up to 15 years, significantly reducing total life cycle costs.



## No Thermal Runaway Characteristic

Verified through rigorous tests such as nail penetration, short circuit, and overcharge, no thermal runaway occurs under any failure mode, providing ultimate assurance for zero-tolerance applications.



## Ultra-Wide Temperature Range

Normal startup at  $-45^{\circ}\text{C}$ , no degradation after long-term storage at  $+85^{\circ}\text{C}$ , ensuring stable operation in all climate zones worldwide.



## Plastic Casing Corrosion Resistance Structure

Unique high-strength plastic casing design effectively protects against harsh environments such as salt spray, humidity, and vibration, ensuring long-term reliability.



# High-Rate Discharge Capability

No Voltage Drop · No Performance Sag · Consistent Stable Output

The core advantage of LYP batteries lies in their excellent high-rate discharge performance. Even under continuous 3C discharge, the voltage curve remains stable, without the common voltage drop seen in traditional batteries. This characteristic ensures that power systems receive a stable and reliable power supply under various load conditions.

## LYP vs. Traditional LFP Discharge Performance Comparison

- **3C Continuous Discharge:** LYP voltage maintained above 3.2V, traditional LFP unusable
- **10C Instantaneous Discharge:** LYP can sustain for 12 seconds, traditional LFP completely unusable
- **Voltage Platform:** LYP platform rate >95%, traditional LFP <80%
- **Energy Efficiency:** LYP efficiency still reaches over 96% at high rates

### Technological Breakthrough

By optimizing electrode materials and electrolyte formulation, the internal resistance of LYP batteries is reduced by more than 40% compared to traditional batteries, thereby achieving industry-leading high-rate performance.

3C

Continuous  
Discharge Rate

Can maintain 3C output for extended periods without performance degradation

10C

Pulse Discharge  
Capability

Short-term pulses can reach 10C to meet instantaneous high-power demands

95%

Voltage Platform  
Rate

Maintains stable voltage output throughout to ensure consistent equipment performance

 Winston Battery



# Wide Temperature Range Capability

Winston Battery LYP cells offer an unprecedented environmental adaptability for power systems. Whether it's the extreme cold of northern winters or the scorching heat of southern summers, LYP maintains stable and reliable performance.



## **-45°C Extreme Cold Start**

Can start and operate normally in extreme low-temperature environments, with capacity retention >70%, providing reliable assurance for cold region applications.



## **+85°C High Temperature Storage**

Can be stored and operated long-term in high-temperature environments without performance degradation, eliminating the risk of high-temperature failure common in traditional batteries.



## **All-Climate Adaptation**

From the Arctic Circle to the equatorial regions, from plateaus to oceans, LYP provides consistent performance.

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## Strategic Significance for Power Systems

### Advantages in Cold Region Applications

- No preheating system required for quick start-up
- Reduced energy consumption, extended range
- Simplified thermal management system, lower costs
- Improved winter operation efficiency and reliability

### High-Temperature Environment Assurance

- Eliminates thermal runaway risk, ensuring safety
- No complex cooling system required, reducing failure rate
- Extended battery life, reduced replacement frequency
- Suitable for high-temperature working conditions in mining, construction, etc.

# Typical Application Scenarios

## Range-Extended EV and Mild Hybrid MHEV

In range-extended electric vehicles and mild hybrid systems, batteries frequently need to handle start-stop cycles and high-current pulse charging and discharging. LYP batteries' high rate capability and ultra-long lifespan perfectly suit this application, providing lasting and reliable power support for vehicles.



### High Current Pulse Response

The engine requires hundreds of amperes of current output during startup. LYP can easily handle pulse discharge exceeding 5C, ensuring quick and reliable starting every time.



### Start-Stop System Stability

In urban conditions, vehicles may start and stop hundreds of times a day. LYP's low internal resistance and high rate characteristics ensure quick response for every start-stop, with no voltage fluctuation.



### Total Lifetime Economy

A cycle life of over 6000 times means the battery can be used for the vehicle's entire lifespan without replacement, reducing total cost of ownership by over 50%.

#### Technical Parameters

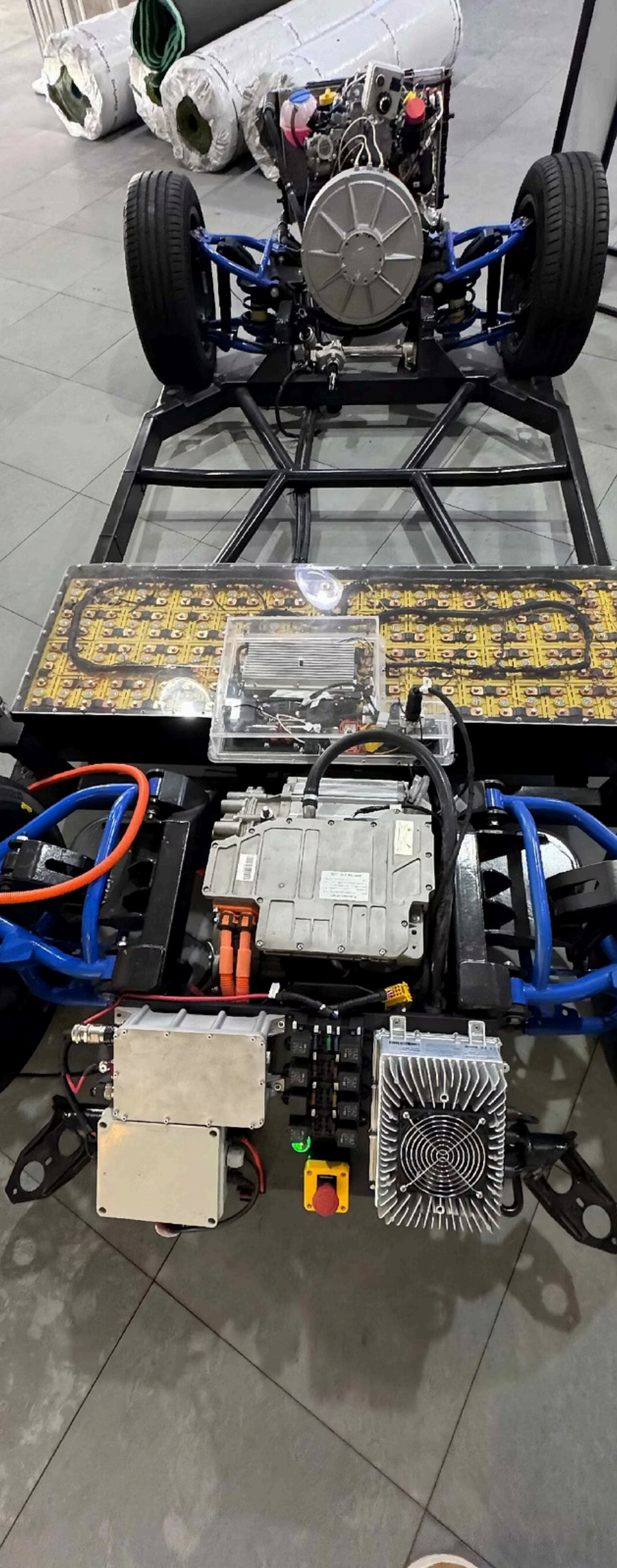
- Pulse Power: >5C/10s
- Starting Current: 500-1000A
- Response Time: <50ms
- Temperature Range: -30~60°C

#### Performance Advantages

- Start Success Rate >99.9%
- No Voltage Sag
- Lifespan > Vehicle Lifespan
- Maintenance-Free Design

#### Application Benefits

- Fuel Economy Improvement: 8-15%
- Emissions Reduction: >20%
- Maintenance Cost Reduction: 60%
- Improved Customer Satisfaction





# Application in Construction Machinery and Special Vehicles

Construction machinery and special vehicles face the most demanding operating environments: continuous high-power output, extreme temperature conditions, and severe vibration and impact. In these "zero-tolerance" application scenarios, LYP batteries become the only reliable choice due to their outstanding safety and reliability.



## High Temperature and Heavy Load Conditions

In scenarios such as mines and construction sites, ambient temperatures can exceed 50°C, and equipment operates continuously at high power. LYP's aqueous system eliminates thermal runaway risks, and its +85°C storage temperature provides absolute assurance for safe operation.



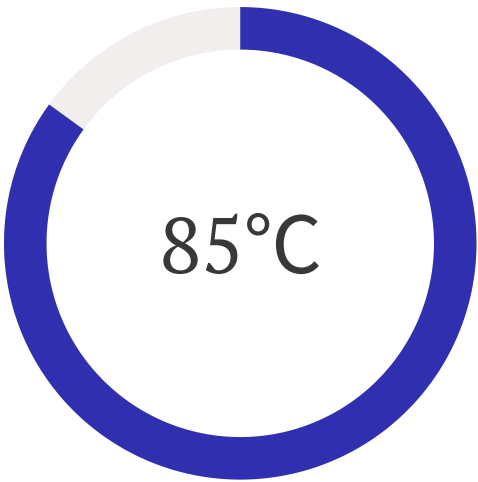
## Continuous High-Power Output

Heavy equipment requires sustained high-power output for extended periods, and traditional batteries often throttle performance due to overheating. LYP can continuously provide 150% of its rated power output, ensuring unrestricted equipment performance.



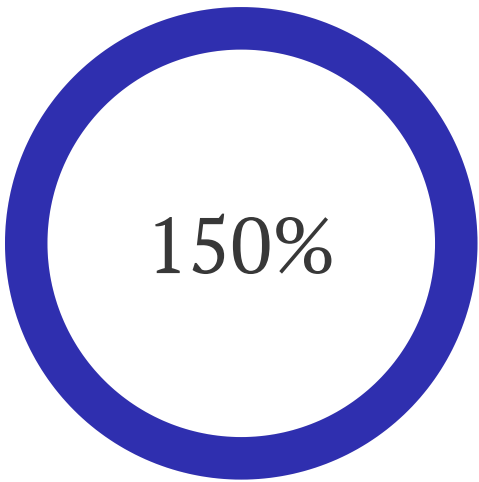
## Zero-Tolerance Safety Standards

A single battery failure can result in millions of yuan in losses and casualties. LYP has passed all safety tests, including nail penetration, extrusion, and overcharge, and will not catch fire under any failure mode, providing ultimate protection for personnel and equipment safety.



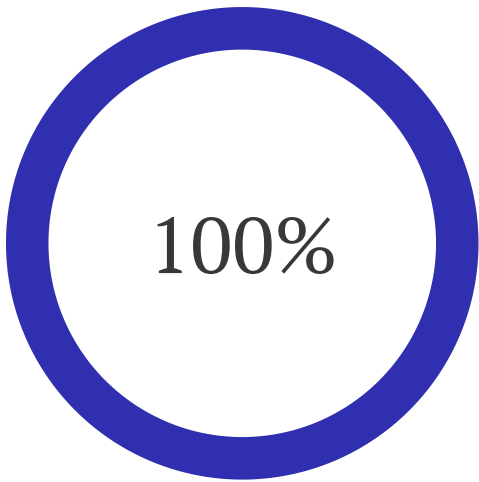
High Temperature Storage Capability

Can operate continuously at +85°C



Power Output Margin

Continuously provides output exceeding rated power



Safety Test Pass Rate

No fire or explosion in all abuse tests

# Airport Ground Support & Mobile Power Equipment

Airport ground support vehicles and mobile power equipment have almost stringent requirements for reliability. Any single battery failure can lead to flight delays, economic losses, and safety hazards. LYP batteries, with their zero-failure design philosophy and outstanding performance, are the optimal choice for these critical applications.



## Zero-Tolerance Operational Requirements

Airport operations do not permit any equipment failures. LYP's ultra-high reliability ensures ground support vehicles are ready 24/7, with a near-zero failure rate.

## Long Standby & Quick Start

A low self-discharge rate (<3%/month) ensures instant startup after long periods of standby, with a response time of <100ms, meeting urgent dispatch needs.



## Application Scenarios & Performance Assurance

### Baggage Tow Tractors

Frequent starts, stops, and acceleration, with over 100 daily starts. LYP's high-rate capability ensures ample power for every start, and an ultra-long lifespan reduces replacement frequency.

### Passenger Stairs & Jet Bridges

Require long-term stable positioning and environmental control. LYP's continuous discharge capability and temperature adaptability ensure passenger comfort and safety during boarding.

### Emergency Power Vehicles

Must be 100% available at critical moments. LYP's zero thermal runaway characteristic and ultra-wide operating temperature range (-45~+85°C) ensure reliable power supply under any conditions.

### Mobile Maintenance Platforms

Carry precision equipment and tools, requiring stable voltage output. LYP's voltage platform rate of >95% provides high-quality power assurance for sensitive equipment.

"In critical environments like airports, we cannot accept any battery failures. Winston LYP batteries' three-year zero-failure record proves their reliability, which is exactly what we need."

— Director of Ground Equipment Management, International Airport

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