



## Hangcha's Full Line of Material Handling Equipment



**HANGCHA**

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***Making Material Handling Easier***  
SINCE 1956





# INNOVATIVE SOLUTIONS NEW POWER NOW



HANGCHA'S  
MANUFACTURING FACILITIES



## WHY PARTNER WITH US?

### HANGCHA HAS OVER 68 YEARS EXPERIENCE IN THE MATERIAL HANDLING INDUSTRY

Since 1956, Hangcha Group continues to engineer and manufacture high quality forklifts and warehouse equipment. This experience, combined with product innovation, has led Hangcha Group to become a global leading full line material handling equipment developer, manufacturer, and supplier. For the last 16 consecutive years, Hangcha Group has also remained the largest Chinese forklift exporter.

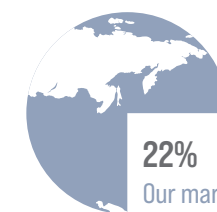
HC Forklift America Corporation is Hangcha Group's U.S. Headquarters. Located in Charlotte, NC, our team of dedicated industry specialist are focused on providing products, support, and parts to our dealers and customers. In addition to our Charlotte, NC headquarters, we have two other dealer support centers strategically placed in Houston, TX and Los Angeles, CA. These three locations offer equipment inventory, lithium-ion battery service centers, and comprehensive support for our dealers and end-users.



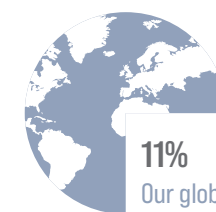
**400,000**  
We produce more  
than 400,000  
units annually.



**180**  
We export to  
180 Countries



**22%**  
Our market  
share in China  
is over 22%



**11%**  
Our global  
market share  
is 11%.

[www.hcforkliftamerica.com](http://www.hcforkliftamerica.com)

Lithium-ion technology (Lithium Iron Phosphate, LiFePO<sub>4</sub>), was developed jointly by HANGCHA and CATL for use in material handling equipment applications. These innovative and reliable battery cells are manufactured to the highest standard by CATL exclusively for Hangcha Group's full line of material handling equipment.





# FULL LINE OF MATERIAL HANDLING EQUIPMENT

Electric  
Pneumatic &  
Cushion Forklifts

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Narrow Aisle  
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High Voltage  
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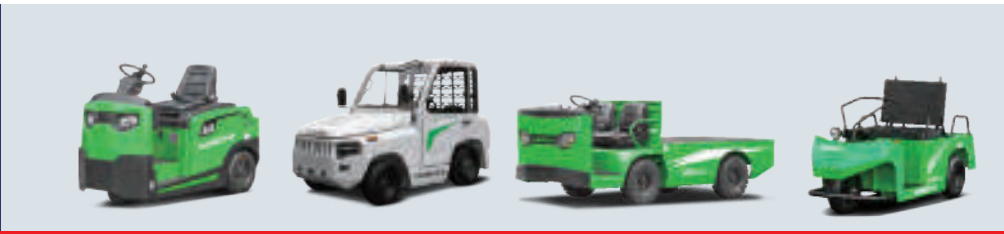
Electric Pallet  
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Tow Tractors/  
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Internal  
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Rough Terrain  
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Internal  
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Hangcha's  
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# Class 1: Electric Cushion & Pneumatic Forklifts



Hangcha offers a line of electric cushion and pneumatic forklifts with load capacities ranging from 3,000-36,000lbs. These forklifts are powered using our Lithium Iron Phosphate (LiFePO<sub>4</sub>) battery packs. These lithium-ion forklifts feature longer running times, opportunity charging, maintenance-free batteries, and a lower total cost of ownership when compared to similar lead-acid powered forklifts.



**X Series 3-Wheel  
Electric Lithium-ion Forklift**  
1,700lb Load Capacity



**XC Series 3-Wheel  
Electric Lithium-ion Forklift**  
3,200-4,000lb Load Capacity



**A Series 3-W Electric Lithium-ion  
Stand-Up Counterbalanced Forklift**  
3,000-5,000lb Load Capacity



**X Series Electric Lithium-ion  
Cushion Tire Forklift**  
3,000-6,500lb Load Capacity



**XC Series Electric Lithium-ion  
Compact Pneumatic Tire Forklift**  
4,000-7,000lb Load Capacity



**XE Series Electric Lithium-ion  
Pneumatic Tire Forklift**  
4,000-7,600lb Load Capacity



**X Series Electric Lithium-ion  
Cushion Tire Forklift**  
8,000-12,000lb Loading Capacity



**XC Series Electric Lithium-ion  
Pneumatic Tire Forklift**  
8,000-11,000lb Loading Capacity





# Class 2: Electric Stock Pickers & Narrow Aisle Forklifts



Narrow aisle operation demands efficiency, safety, and performance. Hangcha has designed our electric reach trucks, high level order pickers, and a stock picker to meet all three requirements with world class engineering and the dependability that Hangcha Group is known for. Powered using lithium-ion batteries, Hangcha's narrow aisle equipment is the perfect addition to your warehouse or distribution center.



**XC Series Lithium-ion  
Swing Reach Turret Truck**  
3,500lb Load Capacity



**A Series Lithium-ion  
High Level Order Picker**  
3,000lb Load Capacity



**A Series Lithium-ion  
Narrow Aisle High Level Order Picker**  
3,000lb Load Capacity



**X Series Lithium-ion  
Pantograph Single Reach Truck**  
3,000-4,500lb Load Capacity



**X Series Lithium-ion  
Pantograph Double Reach Truck**  
3,000-3,500lb Load Capacity



**A Series Electric  
Lithium-ion Mini Stock Picker**  
470lb Load Capacity



**A Series Electric  
Lithium-ion Stock Picker**  
1,000lb Load Capacity





# Class 3: Electric Pallet Jacks



Hangcha's lithium-ion powered electric pallet jacks were designed with North American logistics applications in mind. These efficient pallet trucks combine safety, reliability, and ease of operation to increase productivity in the high intensity operational environments of North America warehouses and manufacturing facilities.



**WS Series Lithium-ion Walkie Pallet Jack**  
3,000lb Load Capacity



**A Series Lithium-ion Walkie Pallet Jack**  
3,000-4,000lb Load Capacity



**A Series Lithium-ion Walkie Pallet Jack**  
5,000lb Load Capacity



**A Series Lithium-ion Walkie Pallet Jack**  
6,000-8,000lb Load Capacity



**A Series Lithium-ion End Control Rider Pallet Jack**  
6,000-8,000lb Load Capacity



**A Series Lithium-ion Center Control Rider Pallet Jack**  
6,000-8,000lb Load Capacity



**A Series Lithium-ion Stand-Up Tow Tractor**  
10,000lb Load Capacity





**HANGCHA** Lithium-ion  
Re-imagining **POWER**



**A Series Lithium-ion  
Walkie Straddle Stacker**  
2,500lb Load Capacity



**A Series Lithium-ion  
Industrial Walkie Stacker**  
2,500-4,000lb Load Capacity



**A Series Lithium-ion  
Industrial Walkie Reach Stacker**  
3,000lb Load Capacity



**A Series Lithium-ion Industrial  
Walkie Counterbalanced Stacker**  
2,000-4,000lb Load Capacity



# Class 3: Electric Walkie Stackers

Hangcha's lithium-ion powered electric walkie stackers were designed with North American logistics applications in mind. These efficient pallet trucks combine safety, reliability, and ease of operation to increase warehouse productivity in the high intensity operating environments of North America warehouses.







## Class 4: IC Cushion Forklifts

Designed for the North American market, the XF Series LPG Cushion Tire Forklifts are built to work in the confined spaces of warehouses, distribution centers, and manufacturing facilities. These forklifts feature a load capacity ranging from 3,000-15,500lbs. These forklifts also include the latest advancements from Hangcha Group. They include LED efficient lighting, a load-sensing hydraulic system, a low-emission engine, noise & vibration control, and a new control system. The XF Series LPG Cushion Tire Forklifts provide safe and efficient solutions for confined spaces where higher load capacities are needed.



**XF Series  
LPG Cushion Tire Forklift**  
3,000-6,500lb Load Capacity



**XF Series  
Box Car Special Forklift**  
8,000-12,000lb Load Capacity



**XF Series  
Paper Roll Special Forklift**  
12,000lb Load Capacity



**XF Series  
LPG Cushion Tire Forklift**  
13,500-15,500lb Load Capacity







## Class 5: IC Pneumatic Forklifts

Over 30 years of building forklifts have culminated in the XF series from Hangcha Group. This experience in forklift manufacturing, combined with the latest in forklift technology, results in a line of forklifts that are efficient, comfortable, reliable, and safe. The XF Series IC Pneumatic Tire Forklifts represent the true do it all forklift from Hangcha Group.



### XF Series Compact Pneumatic Tire LPG Forklift

5,000lb Load Capacity



### XF Series Pneumatic Tire LPG, Dual Fuel, or Diesel Forklift

LPG: 3,000-7,000lb Load Capacity  
Dual Fuel: 4,000-7,000lb Load Capacity  
Diesel: 4,000-7,000lb Load Capacity



### XF Series Pneumatic Tire LPG, Dual Fuel, or Diesel Forklift

8,000-11,000lb Load Capacity



### XF Series Pneumatic Tire LPG/Diesel Forklift

11,000-15,500lb Load Capacity







## Class 5: Heavy Duty Forklifts

The X Series Heavy Duty Pneumatic Forklifts are a new generation of heavy duty forklift that Hangcha has developed. Redesigned from the ground up, the new X Series Heavy Duty Pneumatic Forklift provides operators with comfort, performance, efficiency, and reliability. All of this translates into our X Series Heavy Duty Forklifts being able to take on the demanding operational environments found in the steel, port, lumber, and breakbulk industries.



### XF Series Pneumatic Tire Diesel Forklift

17,500-26,000lb Load Capacity



### Heavy Duty X Series Pneumatic Tire Diesel Forklift

26,000-36,000lb Load Capacity



### Heavy Duty X Series Pneumatic Tire Diesel Forklift

55,000-77,000lb Load Capacity



### Heavy Duty X Series Pneumatic Tire Diesel Forklift

105,000lb Load Capacity





**HANGCHA** Lithium-ionRe-imagining **POWER**

## Class 1: High Voltage Heavy Duty Electric Pneumatic Forklifts



XH Series High Voltage Lithium-ion Pneumatic Forklifts are new series of high voltage lithium-ion forklifts independently developed by Hangcha Group. These heavy duty electric pneumatic forklifts, with load capacities ranging from 26,000-55,000lbs, are powered using our high voltage Lithium Iron Phosphate (LiFePO<sub>4</sub>) battery packs. These lithium-ion forklifts feature longer running times, opportunity charging, maintenance-free batteries, and a lower total cost of ownership when compared to similar I.C. powered forklifts. This allows them to work successfully in the steel, port, lumber, and breakbulk industries.

### Heavy Duty XH Series Electric Lithium-ion Pneumatic Tire Forklift

26,000-36,000lb Load Capacity



### Heavy Duty XH Series Electric Lithium-ion Pneumatic Tire Forklift

55,000lb Load Capacity





**HANGCHA** Lithium-ionRe-imagining **POWER**

## Class 6/Specialty: Tow Tractors/Utility Vehicles

Hangcha's tow tractors and utility vehicles offer load capacities ranging from 770-70,000lbs. The tow tractors and utility vehicles are powered by Lithium Iron Phosphate (LiFePO<sub>4</sub>) battery packs. This allows the equipment to have a maintenance-free battery and to be able to rapid/opportunity charge. Hangcha's Tow Tractors and Utility Vehicles are perfect for the automotive, aviation, and manufacturing industries.



**A Series Electric  
Lithium-ion Tow Tractor**  
4,500-13,500lb Towing Capacity



**X Series Electric  
Lithium-ion Heavy Duty Tow Tractor**  
44,000-70,000lb Towing Capacity



**X Series Electric  
Lithium-ion Burden Carrier**  
3,000-6,000lb Load Capacity



**X Series Electric  
Lithium-ion Personnel Carrier**  
770lb Load Capacity / 4,850lb Tow Capacity







## Class 7: Rough Terrain Forklifts

Hangcha's rough terrain forklifts with 4WD were developed from the XF series forklifts that Hangcha Group manufactures. They use either the Deutz or Kubota diesel engine to give them the power needed to navigate through any type of terrain. These forklifts, with up to a 11,000lb load capacity, easily navigate through the rugged roads found in the stone industry, lumber industry, and at construction sites. The 4WD system works with the unique tire tread to provide traction in wet and slippery conditions. Because the road isn't always smooth, choose Hangcha's Rough Terrain Forklifts.



### Four-Wheel Drive Rough Terrain Forklift

5,000-7,000lb Load Capacity



### Four-Wheel Drive Rough Terrain Forklift

11,000lb Load Capacity







# LITHIUM-ION POWERED

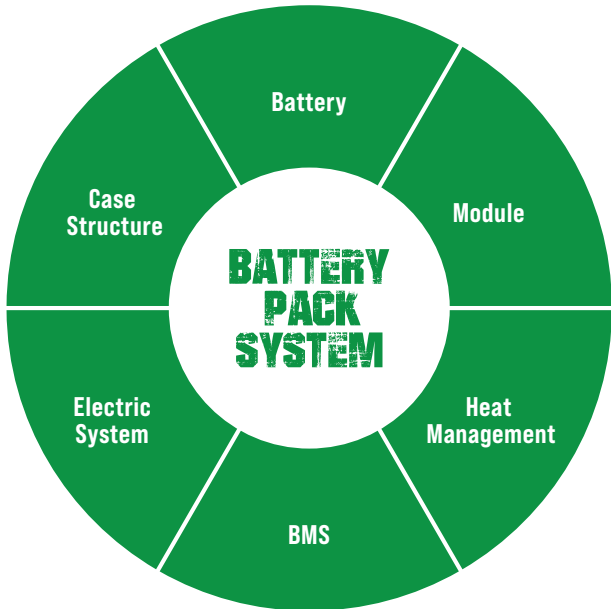
## THE FUTURE IS NOW

SUPERIOR PERFORMANCE, INNOVATIVE TECHNOLOGY, & ECONOMICAL SOLUTION.

- » / Long Service Life
- / Energy Saving
- / Safe and Reliable
- / Maintenance-Free
- / Fast Charging
- / High Energy Density
- / Compact Chassis

## LITHIUM-ION BATTERY ADVANTAGES

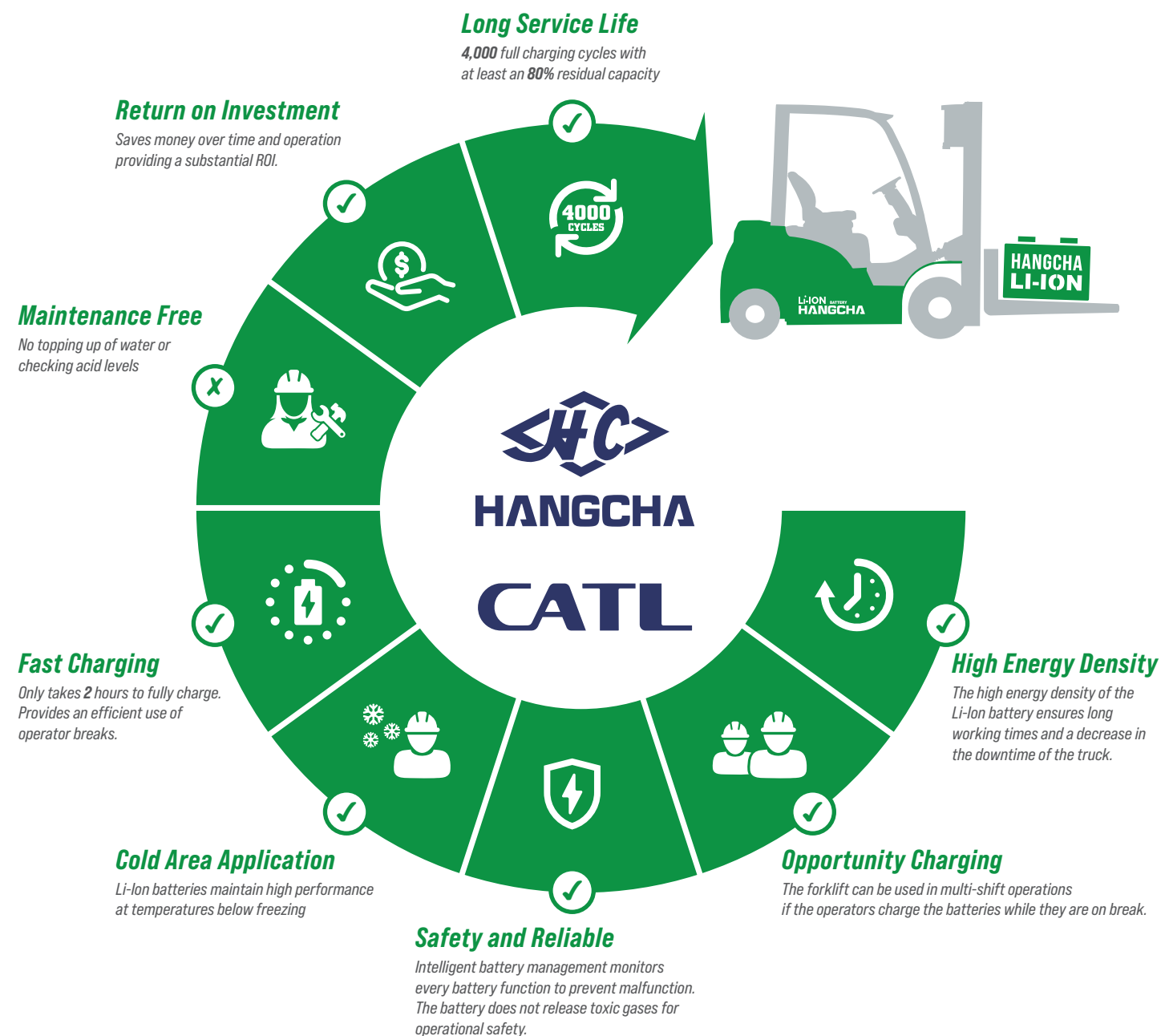
- / **Battery Technology:** We use square lithium iron phosphate batteries. These are the same type of batteries used in new electric vehicles.
- / **Design:** The module uses a sturdy and lightweight aluminum alloy frame. It is also designed to provide excellent heat dissipation.
- / **Safe and Effective:** Charging efficiency as high as 98% and the thermal runaway temperature is at 600 °C and above.
- / **Adapted to Low Temperatures:** Comes standard with an electrical heating feature, ensuring normal operation in low temperatures.
- / **Quick Charging:** Fully charges in 2 hours.
- / **Efficient:** Can use opportunity charging to allow for continuous use in multi-shift operations.
- / **Long-Lasting:** 4000 charging cycles with a capacity retention greater than 80%.
- / **Maintenance-Free:** Lithium-ion batteries do not require manual maintenance such as watering.
- / **Green and clean:** The batteries are pollution-free, release zero emissions, and are recyclable.





# DESIGN PHILOSOPHY

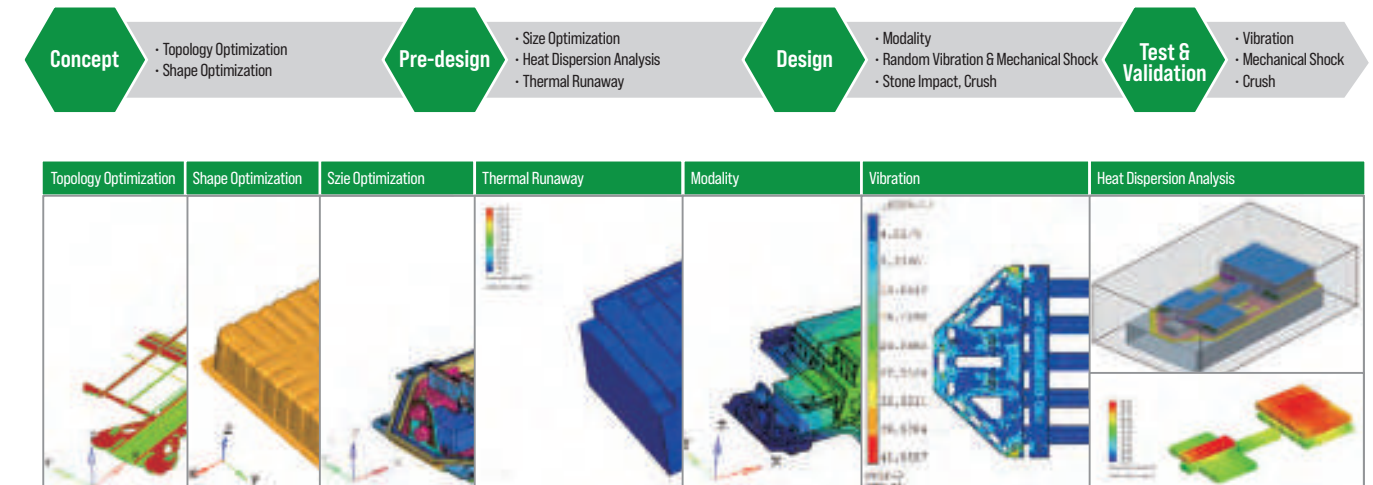
After seeing the benefits that lithium Iron Phosphate (LiFePO<sub>4</sub>) battery technology has when compared to traditional lead-acid batteries, Hangcha Group realized the material handling industry would be the perfect beneficiary for this technology. Lithium-ion technology would give material handling equipment the ability to run longer, more reliably, and require less maintenance. Hangcha Group worked closely with CATL to develop lithium-ion technology specifically for this industry. Hangcha then redesigned our material handling equipment around this technology. The result is a line of fast charging, long lasting, maintenance-free forklifts with the ability to run efficiently in multi-shift operations.



## Safety

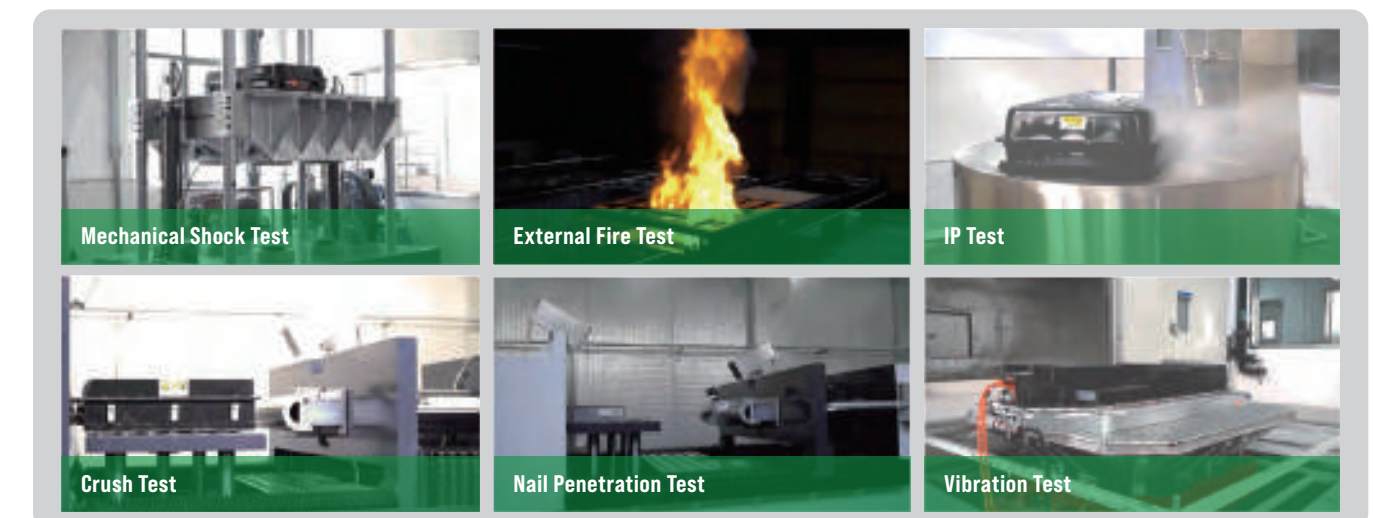
While designing the lithium-ion technology for Hangcha's material handling equipment, safety was of our top concerns. We wanted a system that was not only efficient, but also safe for the operators and surrounding employees. In fact, CATL's batteries have caused 0 safety accidents. Between 2014 and 2017, the number of passenger cars using CATL batteries exceeded 95,000. Even with the amount of batteries being used, CATL products still caused 0 safety accidents. After designing the system, Hangcha and CATL performed over 48 safety tests to make sure that the battery packs could safely handle the harsh environments that our users operate their equipment in. The result is a line of lithium-ion battery systems that has passed all of our tests and are extremely safe for our users.

## Safety Design



## Comprehensive Test & Validation

Hangcha and CATL have a large testing lab devoted to our lithium-ion battery systems. This lab allows us to perform over 273 kinds of tests on the battery pack systems before releasing them to the market. These tests include 100 performance tests, 48 safety tests, and 125 reliability tests. By thoroughly testing the battery pack systems, we can offer up to a 10-year 20,000-hour warranty on our battery packs. The time spent designing and testing translates to a reliable, safe, and efficient battery system designed to increase productivity and eliminate downtime.





# FEATURES & BENEFITS

## Power

- / The Lithium-ion battery has a high energy density. When compared to an identical volume as a lead-acid battery, the Li-Ion battery contains twice as much energy.
- / Quick opportunity charging equals constant availability.
- / Stable voltage supply throughout the discharging process means that the truck will run longer on a single charge.
- / Li-Ion batteries maintain their performance level at temperatures below freezing making them ideal for use in cold areas.

## Precision

- / The truck communicates with the battery controller to precisely control the use of the lithium-ion battery.

## Compactness

- / Higher energy density means that the battery can hold the store about of energy in a smaller space.

## Safety

- / Intelligent battery management monitors every important battery function.
- / Higher user safety, thanks to an acid-free battery.
- / User friendly thanks to not having to change the battery.
- / The battery does not emit toxic gasses.

## Environmentally Friendly

- / These batteries have twice the service life making them environmentally friendly.
- / The batteries also do not contain any acid making them environmentally friendly.
- / The Li-Ion batteries are substantially more efficient when charging and discharging which reduces energy costs and is environmentally friendly.

## Ergonomics

- / Because battery changes are not needed, the operator is not physically strained.
- / These batteries are maintenance-free meaning that the user doesn't need to top off the water or check the battery's acid levels.
- / The user doesn't have to preform a pre-work check on the battery.

## Warranty

The Integrated Battery Management System (BMS) continually monitors energy management and ensures reliable operation. Because of this reliability, Hangcha provides up to a **10 year** or **20,000 hours** warranty on our lithium-ion battery packs.



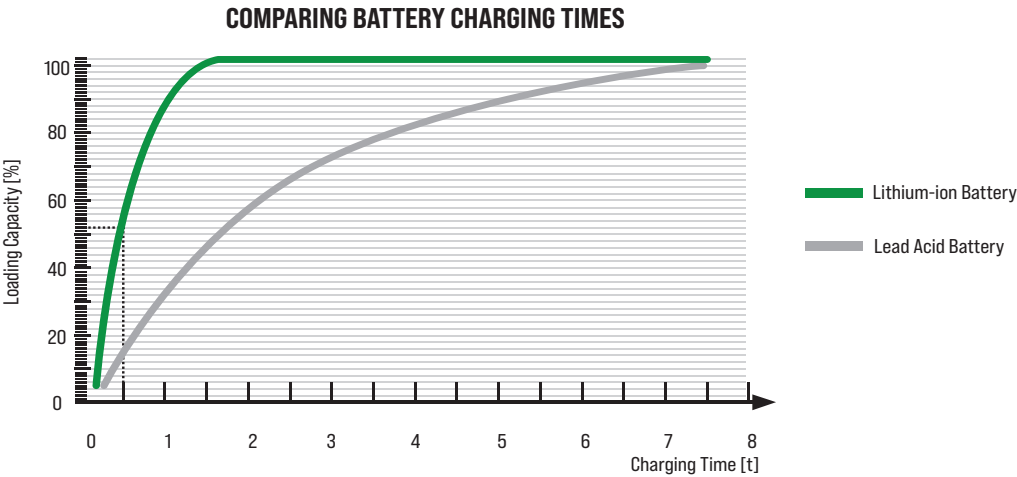
**10 YEAR  
WARRANTY**



# CHARGING

*Rapid charging and opportunity charging ensure continuous availability of vehicles.*

The chargers allow for fast full charging or boost charging (**100 % charge in 2 hours**). The lithium-ion batteries are maintenance free and do not require a battery change when used in multi-shift operations. Instead, the batteries can be charged during user breaks and shift changes which allows the forklift to run continuously during multi-shift operations.



Lithium-ion Batteries

**VS**

Lead Acid Batteries

## BMS Security Strategy

HANGCHA battery management system (BMS) monitors the li-ion cells at all time. As a result, our li-ion solution is the most reliable power option.



### Battery Safety Management

- Overcharge/over discharge protection
- Overcurrent/over-temperature/low- temperature protection
- Multi-level fault diagnosis protection
- Double fault monitoring



### Battery Parameter Detection

- Battery voltage detection and analysis
- Battery current detection and analysis
- Battery temperature detection and analysis



### SOC/SOH Detection

- Residual capacity estimates
- Battery health estimates
- High precision capacity integration



### Equilibrium Management

- Equalization based on voltage mode
- Equalization based on time mode
- Equalization based on battery cell SOC
- Active/passive equalization optional



### High Pressure Safety Management

- High voltage interlock(HVIL)
- High voltage insulation monitoring
- High voltage switch diagnostics

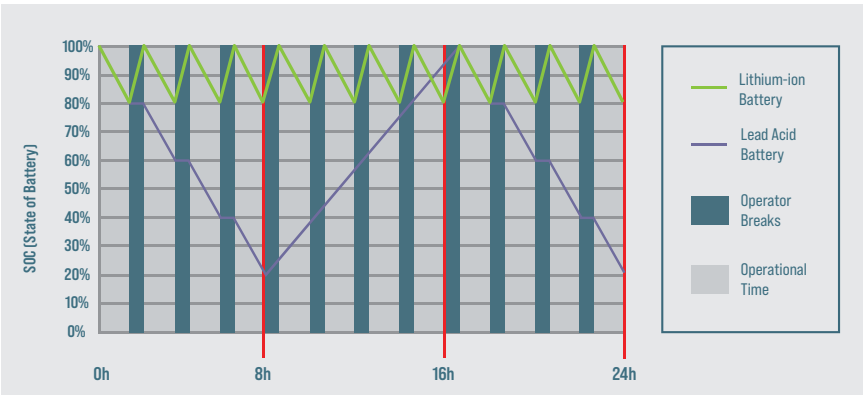


### Other Features

- Low cost,low power consumption
- Historical data record
- Flexible cascade expansion
- CRC data validation

# EFFICIENCY

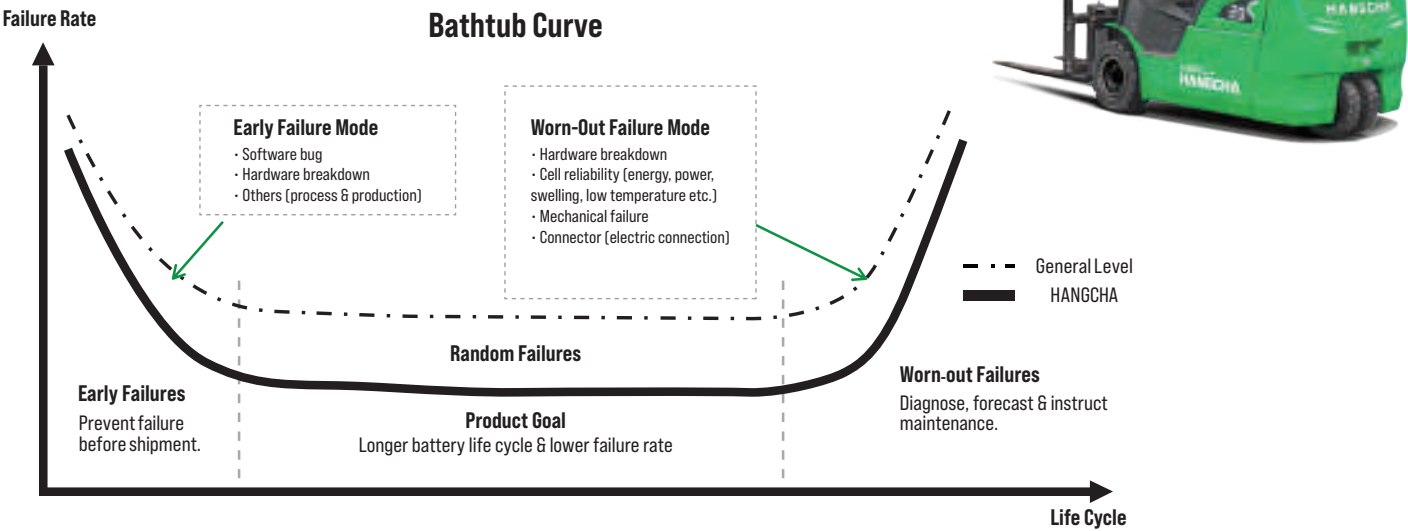
The high-performance lithium-ion technology shines in cases where lead acid batteries are in use and have to be changed in two/three-shift operations. Lithium-ion batteries do not need to be replaced. By quickly charging during downtime, such as during the user's lunch break, the battery can be efficiently used allow the forklift to remain operational throughout all three shifts. This is called **OPPORTUNITY CHARGING**. Intermittently charging also does not affect the battery service life. Lithium-ion technology supplies constant voltage throughout the entire operational time. This means that the operator can work under full power throughout several shifts without having to change a battery or do any kind of maintenance.





# RELIABILITY

## HIGHLY RELIABLE THROUGHOUT THE BATTERY'S ENTIRE LIFE

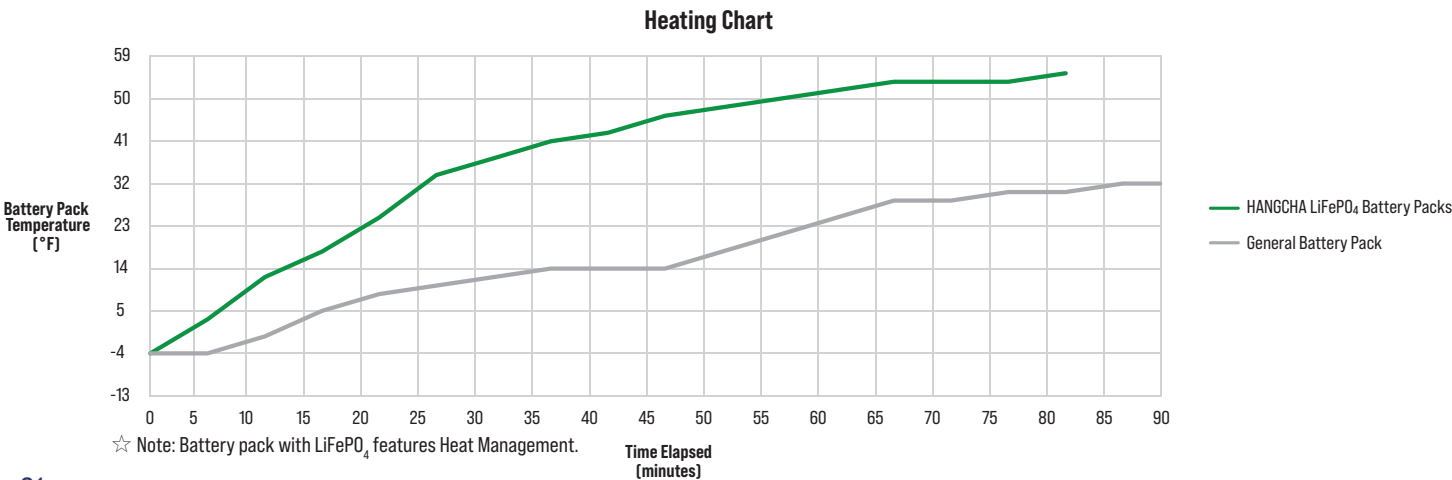


# PERFECT PERFORMANCE IN COLD AREA



### BATTERY PACK HEAT MANAGEMENT

During the discharge process, HANGCHA's battery pack temperature rises from -4°F to 32°F and only takes **25-30** minutes thanks to its heat management. During the discharge process, a general battery pack's temperature rises from -4°F to 32°F but will take 85-90 minutes. This means that Hangcha's Lithium-ion forklifts are perfect for cold operation applications.



# LONG CYCLE LIFE

### BATTERY PACK CYCLE LIFE TEST

#### Attenuation rate comparison

HANGCHA: First year 6.29%, Second year 4.66%, third year 3.18%

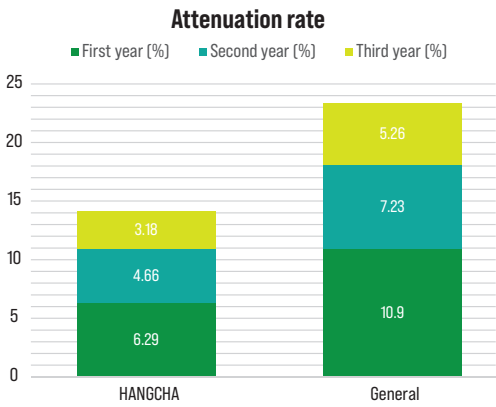
**Total attenuation 14%**

General: First year 10.9%, Second year 7.23%, Third year 5.26%

**Total attenuation 23.4%**

This means that Hangcha's lithium-ion batteries last longer and hold more energy over time compared to a general battery.

**HANGCHA provides the Lithium-ion (LiFePO<sub>4</sub>) battery with up to a 10 year or 20,000 hour warranty.**

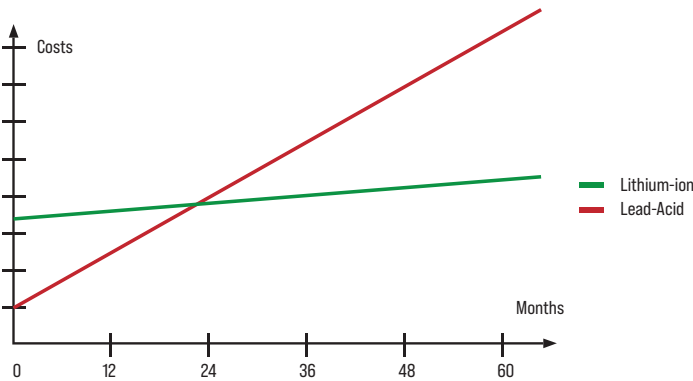


# Total Cost of Ownership Comparison

After taking a look at the complete total cost of ownership (TCO), the initial investment of the equipment is more than compensated for by HANGCHA's longer service times and significantly lower operating expenses. This means that the lithium-ion trucks, including the initial cost, will cost the user less over time than lead acid forklifts.

Item	Unit	Lithium Battery	Lead Acid Battery
Voltage	V	48	48
Capacity	Ah	400	500
Battery Energy	KW.h	19.2	24
Charge Efficiency	%	95%	70%
Times Charged Annually	Time	300	300
Electricity Price	USD/KW.h	0.14	0.14
Annual Cost of Electricity	USD	866	1469
Annual Maintenance Cost	USD	0	1429
Maintenance Cost over Ten Years	USD	8661	28980
Purchase Cost Over Ten Years	USD	15714 (1 unit)	25286 (3~4 unit)
Total Cost per Forklift	USD	24376	54266

☆ The chart above uses actual data from an operational lithium-ion forklift.



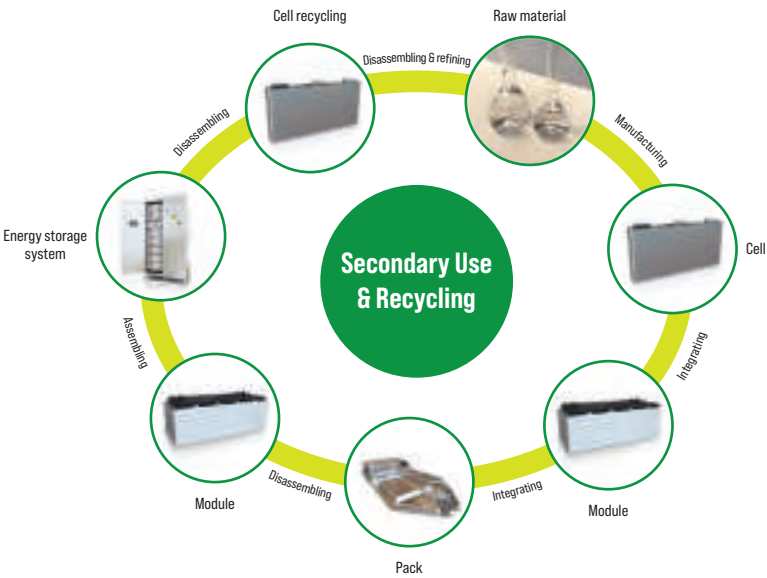
### Lithium-ion Battery Recycling Solution

In the future, battery components will not be sourced solely from mining. They will also have to come from recycling. HANGCHA and CATL are committed to improving the secondary use technology needed to properly recycle and refine the recycled batteries back into raw materials. In doing so, we are hoping to protect the environment for future generations.

### 24/7 Service by Hangcha and CATL

Service Purpose: Leading the way with attentive service.

Service Concept: Results orientation and quick service.







# The New XH Series High Voltage Lithium-ion Forklifts

XH Series High Voltage Lithium-ion Pneumatic Forklifts are new series of high voltage lithium-ion forklifts independently developed by Hangcha Group. By applying the same technology found in automobile applications, Hangcha's high voltage forklifts are designed to outperform similar electric and internal combustion forklifts. Hangcha Group is redefining electric forklifts' efficiency, power, and reliability with the XH Series High Voltage Lithium-ion Forklifts.

## High Voltage Technology

After the success from our full line of lithium-ion equipment, Hangcha decided to up the voltage by creating a new line of high voltage lithium-ion pneumatic forklifts and container equipment. This equipment is designed to cut charging times down to as little as one hour while increasing the run time of the forklifts to over 12 hours. By using high voltage technology, companies are able to save over 90% of the total cost of ownership when compared to similar I.C. powered forklifts.

VOLTAGE

309V - 650V

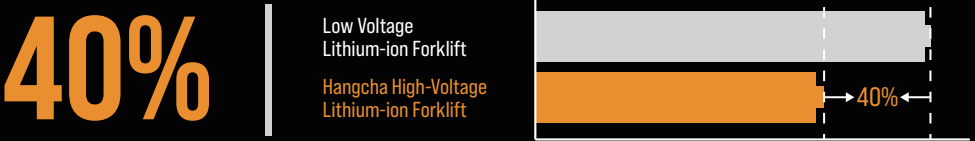
\*Depending on model

RUN TIME

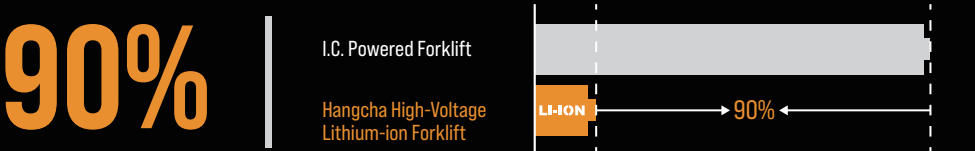
12 Hours

### FASTER & MORE EFFICIENT

Compared to low-voltage lithium-ion forklifts, high-voltage lithium-ion technology can save operators about 40% throughout their ownership when comparing the total cost of ownership.

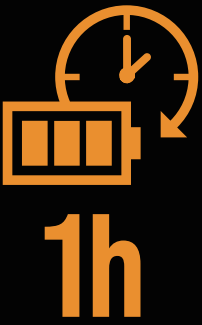


Compared to I.C. powered forklifts, high-voltage lithium-ion technology can save operators about 90% throughout their ownership when comparing the total cost of ownership.



THE *Plus*  
FOR YOUR BUSINESS

### Rapid Charging



The XH Series can rapid charge in one hour to 100% depending on the model. The XH Series can also opportunity charge as needed.

### Longer Lasting



Under normal charging and discharging conditions, the lithium battery of Hangcha products has a capacity retention rate of more than 75% and a life span of up to 10 years after 4000 cycles of charging and discharging.