

# Toyota lithium-ion batteries

in-house assembled





# JOIN THE LITHIUM-ION MOVEMENT

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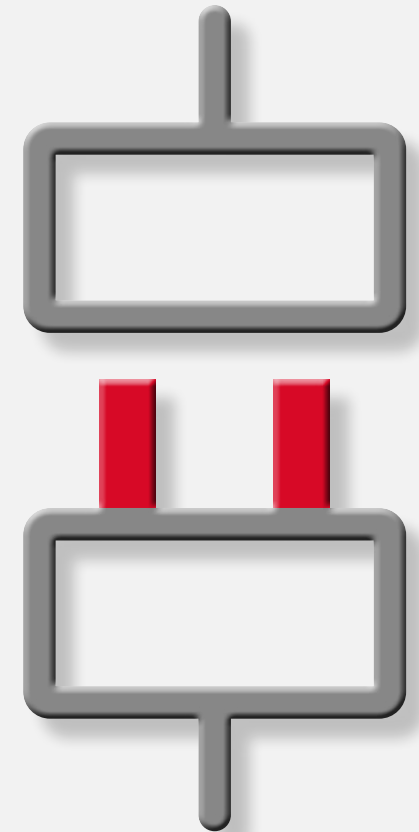
Of all the energy solutions available when choosing an electric forklift, lithium-ion batteries are growing the fastest in terms of popularity.

Thought of as a safe and operator-friendly alternative to lead acid-batteries, lithium-ion batteries deliver maximum power all the time, regardless of how much charge is left (unlike lead-acid batteries, where speed and lifting capacity can drop as charge depletes). That makes lithium-ion batteries an ideal choice for high-intensity operations, where time is precious and there's no room for reduced performance.

However, lithium-ion batteries are also highly suited to smaller and less demanding applications, and many customers that do not operate high-intensity operations have also worked out that a lithium-ion battery truck will suit their needs, boost their sustainability and cost less over the entire forklift's lifespan.

Toyota has assembled thousands of lithium-ion batteries installed in our trucks throughout Europe, providing businesses with a high-quality and safe way to power their material handling equipment. From speaking to customers, we've learnt what really makes lithium-ion-powered trucks appeal to so many operators and facilities, and why their appeal continues to grow so quickly.

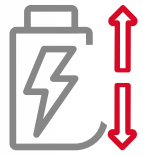
Have you joined the lithium-ion movement yet?



# WHY CHOOSE LITHIUM-ION BATTERIES?

We have compiled several reasons why lithium-ion can cover all your needs – no matter the temperature your trucks are operating in, we have you covered. Indoor, outdoor, cold, lithium-ion works perfectly. Do you have high, medium or low-intensity operations? Lithium-ion is flexible and can work everywhere where opportunity charging is possible.

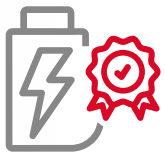




## BATTERY SIZE FLEXIBILITY

Don't assume all batteries are the same. In fact, it's easy for trucks to carry batteries that are larger and heavier than what they really need. Since a 50Ah battery will supply enough power for 70% of small power pallet truck applications, many trucks don't need a full-size battery block since you can opportunity charge during the shift. Once you get past the necessary power, all it does is weigh you down.

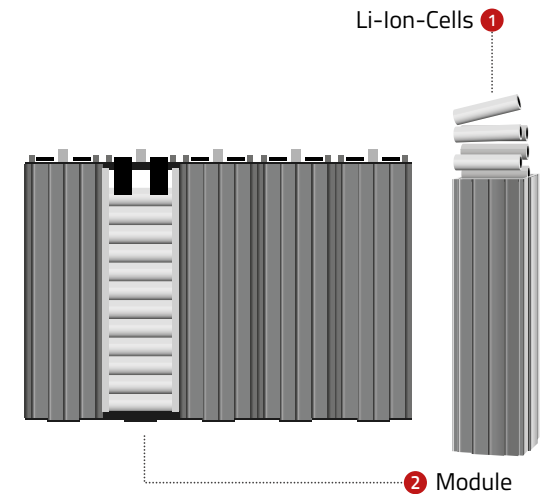
Toyota lithium-ion batteries are built from a combination of independent modules, meaning the size can be adapted to your specific requirements. Toyota lithium-ion trucks benefit from the ideal balance of power and light weight.



## RELIABILITY

Based on cylinder-shaped cells with high mechanical resistance, the Toyota lithium-ion battery is built to react to vibrations, temperature and humidity changes. As a result, it delivers reliable performance in a wide range of industry use cases.

Toyota lithium-ion batteries use a premium chemistry, which offers the highest level of energy density on the market, enabling maximum performance throughout the battery's life.





# INTEGRATED SYSTEM FOR LASTING PERFORMANCE

Toyota's modular lithium-ion system is fully integrated into the truck, making its energy use more efficient. This is enabled by the battery's long lifespan – a single battery can last the entire lifetime of the truck.

The modular system ensures instant delivery of energy even in the most difficult situations, meaning performance levels stay high at all times.



## SAFETY

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All our lithium-ion batteries use cylinder-shaped cells that do not touch each other. This means that if there is a fault with one cell, it won't have a direct effect on the cells next to it – preventing a safety hazard from spreading. It is extremely difficult to damage a cylinder-shaped cell – for example, by poking the battery of another truck, they are extremely unlikely to penetrate the cells.

Each module, as well as the overall battery, is controlled by a BMS (Battery Management System). This system works to prevent misuse and guarantee safe and optimal operation throughout every job.



## SAFE, FLEXIBLE CHARGING

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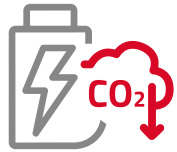
Toyota's unique charging plug and system allows connection and disconnection effortlessly and safely with a simple twisting motion. It supports multiple daily 'plug & charge' connections and disconnections, without time or performance penalties.

Our second generation charging plug (the same one found on Toyota electric cars) is already available on the lithium-ion-powered LW1160 pallet truck, reach truck BT Reflex R-E-O series and the Traigo80 electric counterbalanced truck. This connector offers a new level of ergonomic design, with easy push-in procedure, locking lever and LED charge light indicating status. It is expected to come to the rest of the range in 2022.









# SMART CHARGERS CONTROL POWER CONSUMPTION AND COST

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It is not just the batteries that offer efficiency benefits. The charging units are smart devices that allow you to service different machines in your fleet flexibly and independently.

Each charger has a built-in DPL (Dynamic Power Limitation) system, which identifies different trucks' power levels and directs optimum power to the trucks that need it the most. As a result, recharge to the required level can be completed in the shortest possible time.

In addition, the DPL regulates the charger's overall energy demand, avoiding costly 'power peaks' and making the charge as efficient as possible, with minimal energy loss. As a result, facilities can limit their total energy cost and associated CO<sub>2</sub> emissions.

Some models offer the possibility of incorporating chargers on board, integrated into the machine, meaning they can charge anywhere there is a standard wall socket.



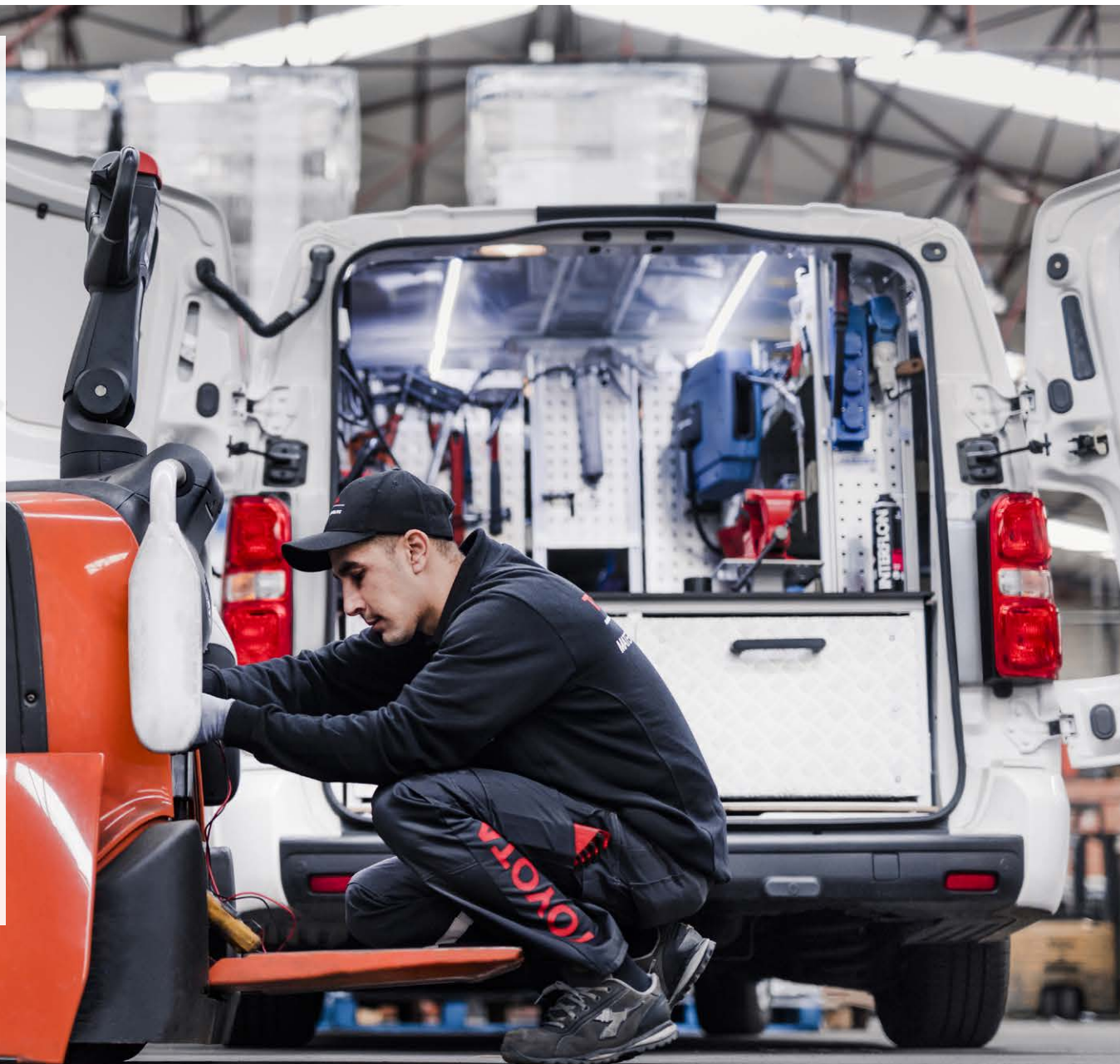
# LOW MAINTENANCE REQUIREMENTS

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The Toyota modular lithium-ion system is designed to keep trucks out of the repair bay and in service – thereby minimising costs and productivity losses. Individual modules can be replaced on site, independently of one another – eliminating the need for an entire battery change in the event of a breakdown. Li-ion batteries require no daily maintenance, unlike lead-acid batteries which you have to top up with water daily.

Toyota also supports customers with robust after-sales service. Toyota's technicians are trained to diagnose and repair the complete solution (truck, battery, and charger) in a single session, again reducing downtime. We back this up with comprehensive and wide availability of spare parts.

BT levio





# LONG LIFETIME

Lithium-ion batteries have a much longer lifetime than lead-acid batteries. In fact, the lifecycle of our modularised battery solutions encompasses four different lives, each covering a different use case:

- **First life:** the battery is manufactured and is integrated into an electric forklift
- **Second life:** as the battery outlives the forklift thanks to the optimised battery system, a new system can be rebuilt out of the battery components
- **Third life:** power banking
- **Fourth life:** valuable metals and other components from the battery are harvested for reuse

UP TO  
7-YEAR  
WARRANTY

Enjoy lasting peace of mind with a 2-year full warranty and up to 7 years of efficiency guaranteed. Contact your Toyota Material Handling representative for the conditions adapted to your application.







# NOT JUST A BATTERY: A COMPLETE ENERGY SOLUTION

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Toyota develops and manufactures every part of your lithium-ion-powered solution: truck, battery, and charger.

Working with us as a single supplier means you benefit from an end-to-end service – from product sourcing to deployment to ongoing support. Our experts will conduct studies of your processes, electrical installations, and existing equipment to determine the solution that most closely fits your needs.

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# OPTIMISE YOUR OPERATIONS

Switching to lithium-ion can be the catalyst for a warehouse redesign that enables a new degree of productivity. Unlike lead-acid batteries, lithium-ion does not require dedicated charging rooms; charging points can be located anywhere, including within work areas. Therefore, more of your facility can be freed up for core revenue-generating activities, and you can rethink your layout to optimise flows and maximise efficiency in your operations.

Whatever your working environment, lithium-ion power can provide the solution. In cold environments, they can work without loss of power or efficiency. The heated batteries allow unrestricted operations, meaning you can optimise your workspace without limits.



# MAKE LITHIUM-ION WORK FOR YOUR OPERATION



## AUTOMATED CHARGING

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The automated guided vehicles from Toyota are available with auto-charging, allowing them to charge quickly and automatically in between tasks without any input from personnel.



## COLD STORE

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Our standard lithium-ion solution can be used in chilled environments and in cold rooms for a limited time. For longer working periods below 0°C, a battery heater is recommended. This solution allows for unlimited cold store time and in-cold store charging. Consult your Toyota representative for more details on the most suitable forklift and battery solution.

# Toyota Material Handling in Europe

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## Total coverage

The Toyota Material Handling network extends to over 30 countries in Europe with more than 5000 mobile technicians.

## Always local – with global support

Wherever you are located in Europe, we are always local, due to our extensive coverage, but with the stability and back-up of a worldwide organisation.

## Made in Europe

Over 95% of trucks we sell are built in our own European factories, in Sweden, France and Italy – all to TPS quality standards. We employ over 3000 production staff in Europe and work with over 300 European suppliers.

Approximately 15% of our European production is exported to other parts of the world.

