

FORKLIFT DECISIONS AND RESPONDING TO THE ELECTRIC TREND

The latest industry innovations mean buyers can choose from a wider selection of units designed to handle modern warehousing needs.



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Introduction

Electric or propane? Narrow-aisle forklifts or traditional counterbalanced units?

Exploring a myriad of forklift options and establishing a clear understanding of choices is essential in today's material-handling environment as companies look for ways to optimize efficiency. The growth of e-commerce, sustainability initiatives, and global market expansion require new forklift buying strategies to handle changing demands. Forklift manufacturers have responded to the needs of operations by introducing new models, including electric forklifts and updates to traditional internal combustion (IC) vehicles, to help companies meet current market demands.

Industrial demand for more versatile forklifts is having a positive impact on forklift orders. The global forklift market is projected to grow at a compound annual growth rate (CAGR) of 6.4% during the 2016-2023 forecast period. Electric forklifts are expected to account for much of this growth.

Electric forklifts are becoming more attractive as battery costs decline and customers continue to seek their fuel-saving and maintenance benefits. This doesn't mean that IC forklifts are no longer relevant. They still account for about 40% of the forklift market and are viable solutions for both indoor and outdoor applications. IC forklifts tend to be more popular for outdoor, high-capacity, and specialty applications, such as paper roll handling and container handling.

Deciding which option is ideal depends on the intended use for the vehicles and operating environment. This white paper will examine the factors organizations should consider when choosing between an electric and IC forklift.

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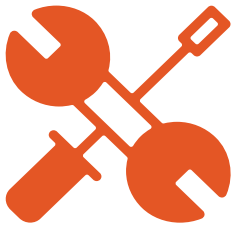


Upfront vs. Lifetime Cost

The initial investment for electric forklifts is more than the upfront cost of an IC vehicle. But the total cost of ownership can vary depending on their intended applications.

Electric forklifts have inherent energy-efficiency advantages. They may be as much as 75% less expensive to operate than propane fuel. According to one energy industry estimate, a 6,000-pound capacity electric forklift operating 40 hours per week would cost \$34,131 less per year than a comparable propane vehicle (assuming propane and electricity prices of \$2.20 per gallon and 12 cents per kilowatt hour, respectively).

Electric forklifts also have maintenance advantages.



The design of electric forklifts typically makes them **more accessible for maintenance** than propane-powered vehicles.

In addition, electric forklifts have fewer moving parts to maintain and repair. IC forklifts require regular engine maintenance, such as oil changes, spark plugs, belts, and inspections. IC engines also tend to create more disposal waste related to maintenance, such as engine oil and transmission fluid.

But depending on the situation, total operating costs may be lower for IC forklifts. Operations that use multiple work shifts may experience greater savings with IC forklifts because of additional maintenance and charging requirements for battery-powered vehicles. Multi-shift operations need to purchase additional electric forklifts, so some vehicles can charge while the others are in use. Or, they may need to keep extra fully-charged batteries on hand and install them to keep vehicles running, which require technical skill and a significant amount of installation time and increase the need for storage space.



As battery inventories and forklift numbers increase, cost savings diminish. Propane tanks can be swapped in a few minutes, and the forklift can be back in operation quickly. Organizations must conduct a cost-benefit analysis specific to their particular operation to determine which type of forklift will yield the greatest savings.

And while IC is a traditional and valid solution to this problem, state-of-the-art companies are now exploring the use of lithium-ion batteries to meet these challenges. These batteries eliminate the need for watering and can be charged much more quickly than lead-acid batteries, even eliminating the need to remove the battery from the truck while still maintaining use of that truck in a multi-shift application.



A Forklift for Every Application

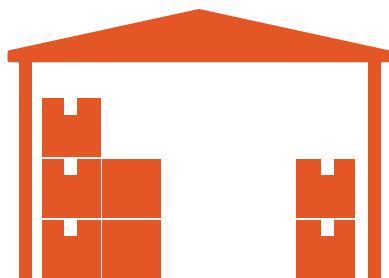
Whether it's navigating through narrow aisles, moving pallets or picking large paper rolls, various environments present unique challenges for material handlers. IC and electric forklifts are divided into seven different classes that handle a wide range of needs. The types of forklifts in each class include:

- **Class I:** Electric motor rider forklifts are typically suitable for loading and unloading tractor-trailers and handling pallets. They're ideal for indoor applications because they are quieter than other forklifts and create no emissions.
- **Class II:** Electric motor narrow aisle forklifts (reach trucks, order pickers) have maneuverability features that allow them to operate in tight spaces and narrow aisles. Typical uses for this class of forklifts include picking and storing inventory. These trucks provide users the ability to increase racking space without expanding their current warehouse.
- **Class III:** Electric pallet jacks, stackers and tow tractors comes in both rider and walk-behind models, often used to unload deliveries and move loads to a staging area where they can be handled by other types of forklifts.



- **Class IV:** IC cushion tire forklifts are IC-powered sit-down units designed for a wide range of indoor applications. Their solid, cushioned tires provide a smooth ride on indoor surfaces and they're puncture-proof since they are not air-filled. Some of the specific applications in this class include forklifts built specifically to lift paper rolls, lifts designed for use in railcars and lifts that can move steel coils.
- **Class V:** IC pneumatic tire forklifts are similar to those in Class IV but were built primarily for outdoor use, including lumberyards, construction sites and other outdoor applications.
- **Class VI:** Electric/IC engine tow tractors includes electric and IC engine tow tractors. These machines are most commonly used for towing loads rather than lifting. Trucks in this class are ideal for use at airports but are also commonly used in assembly line areas.
- **Class VII:** Rough terrain forklifts feature large, tractor-style tires and are powered almost exclusively by diesel engines for outdoor use in rugged terrain. Class VII trucks are most commonly used at lumberyards or construction sites to lift building materials to elevated work sites.

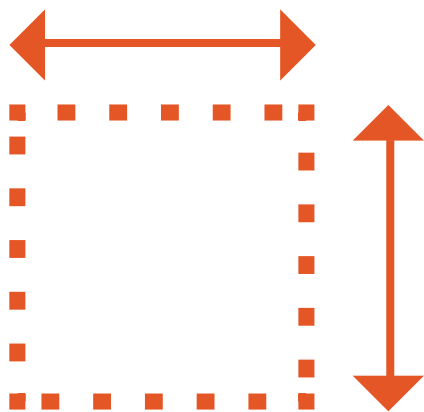
Of course, the types of applications will help determine which forklift is ideal for each operation. One of the other important considerations includes the cost of battery charging infrastructure vs. fuel expenses.



Assess Existing Capabilities

The e-commerce boom has redefined the modern warehouse. Designs continue to evolve as organizations seek ways to accommodate space constraints. Many organizations are building up instead of out due to increased demand for warehousing and distribution facilities.

In addition, warehouse designs are changing to accommodate unique customer orders, including the addition of cross-docks and higher clear heights. The changing landscape means organizations must carefully evaluate which type of forklifts their facilities can handle.



For instance, electric counterbalance forklifts can operate in smaller areas due to the reduced size of the counterweight, which in turn produces a tighter turn radius for operation in narrower aisles compared to IC forklift counterweights. The counterweight is located at the back of the forklift and prevents the forklift from tilting forward when it is loaded. In addition, the battery of electric forklifts acts as a ballast as well as a source of power. Other options may include forklifts specifically designed for narrow aisles, such as three-wheel electric forklifts. Having just one wheel in the back allows for a tighter turn radius than traditional four-wheel forklifts. This means three-wheel electric forklifts don't need as much room to make turns but still have the capacity to lift heavy loads, up to 4,000 lbs.

However, electric forklifts may not be practical for some facilities. The warehouse must be equipped for electric charging needs. Some of the key questions to consider when evaluating electric forklifts include:

- Does the forklift use lead-acid batteries or lithium-ion batteries?
- Do I have adequate room for charging stations? For example, lithium-ion batteries can be charged while a truck is operating and can accept high-rate charging. Lead-acid batteries require longer charging times, so technicians or operators may need to stockpile batteries to swap them out and keep the vehicle running.
- Do I have enough space for battery watering? Facilities need space to perform the watering and to store pure distilled water.
- Do I have the technical expertise to change batteries when necessary?
- Can my facility meet the voltage requirements for electric?

Another consideration is the placement of charging stations. This is more important when using lithium-ion batteries than it is with lead-acid batteries because they are designed for fast charging near the operation site.



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IC forklifts only require storage space for propane tanks. They're also suitable for both indoor and outdoor applications. This is particularly useful for situations that involve moving materials in and out of a facility. Advancements are being made to make electric forklifts more suitable for outdoor use. For example, Toyota's three-wheel electric and 80-volt pneumatic models were designed to protect critical forklift components from potential damage due to water intrusion.

Decision Time: Next Steps

The electric vs. propane buying decision isn't easy. The number of factors that go into picking the proper forklift may seem daunting. Meanwhile, manufacturers are introducing new solutions every year to help organizations adapt to market demands, which can make the decision even more challenging. For example, lithium-ion battery technology continues to evolve. Almost every Toyota electric forklift has one or more compatible lithium-ion batteries on the market.

Purchasing a forklift is a significant investment that buyers shouldn't pursue without outside expertise. Experienced dealers should help organizations evaluate their needs and options, including whether electric or propane forklifts are ideal for their situation.

For more information on how to select a forklift built to handle modern material-handling demands, visit ToyotaForklift.com and contact your **locally authorized Toyota dealer.**



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