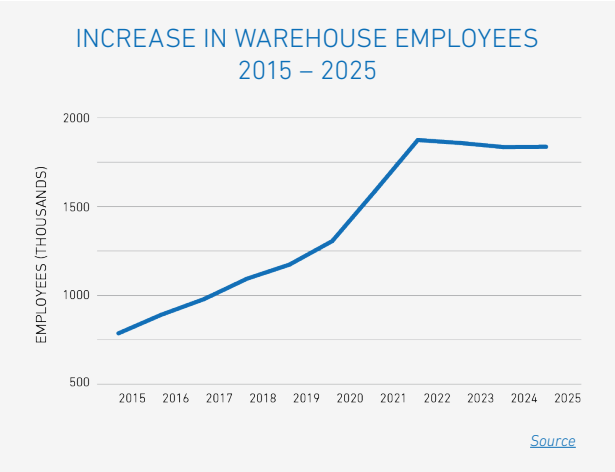
WHITE PAPER

A practical approach to implementing automated lift trucks

Help prepare your warehouse for a successful deployment with these steps

Yale®
LIFT TRUCK TECHNOLOGIES

Global e-commerce is projected to reach $75 trillion by 2034. Supporting this growth means adding more warehouse space to store and fulfill orders. In fact, industrial warehouse space is forecast to grow 31% — or 2.5 billion square feet of additional space — by 2027. And every million square feet of warehouse capacity typically requires 80 to 100 forklifts.



The problem is, who is going to operate them? The warehouse workforce has more than doubled since 2015, but that is still not nearly enough to keep pace with demand. Without enough qualified people to fill job openings, warehouse operations are increasingly relying on inexperienced operators to get the job done. And this reliance on inexperienced forklift operators has compounded common warehouse safety and productivity challenges.

These trends have many operations re-evaluating their timeline for warehouse automation, from an opportunity for tomorrow to an essential for today. But implementation still comes with numerous questions, from the complexity and time required for integration, to cost and return on investment (ROI), to reliability. As facilities fast-track adoption in response to industry challenges and to position themselves for long-term competitive advantage, careful preparation can smooth the path to successful implementation.

Evaluating your operation as a candidate for automated lift trucks

The first step to successfully deploying automated lift trucks is qualifying your operation — essentially, understanding where and how your operation best stands to benefit. Automated lift trucks are not a one-size-fits-all solution, so setting the stage for a tailored approach requires working with a trusted partner to first assess which applications in your facility are best suited for automation. This process encompasses an examination of the environment in which autonomous forklifts would operate, the types of tasks they must complete and characteristics of the loads they must handle. The following characteristics typically indicate an operation is well-suited for mobile robotics:

- Challenges sourcing and retaining labor
- Single- or multi-shift operations
- Repetitive tasks
- Point-to-point material transfers
- Indoor work setting
- Clean, smooth, dry floors

Enabling successful implementation

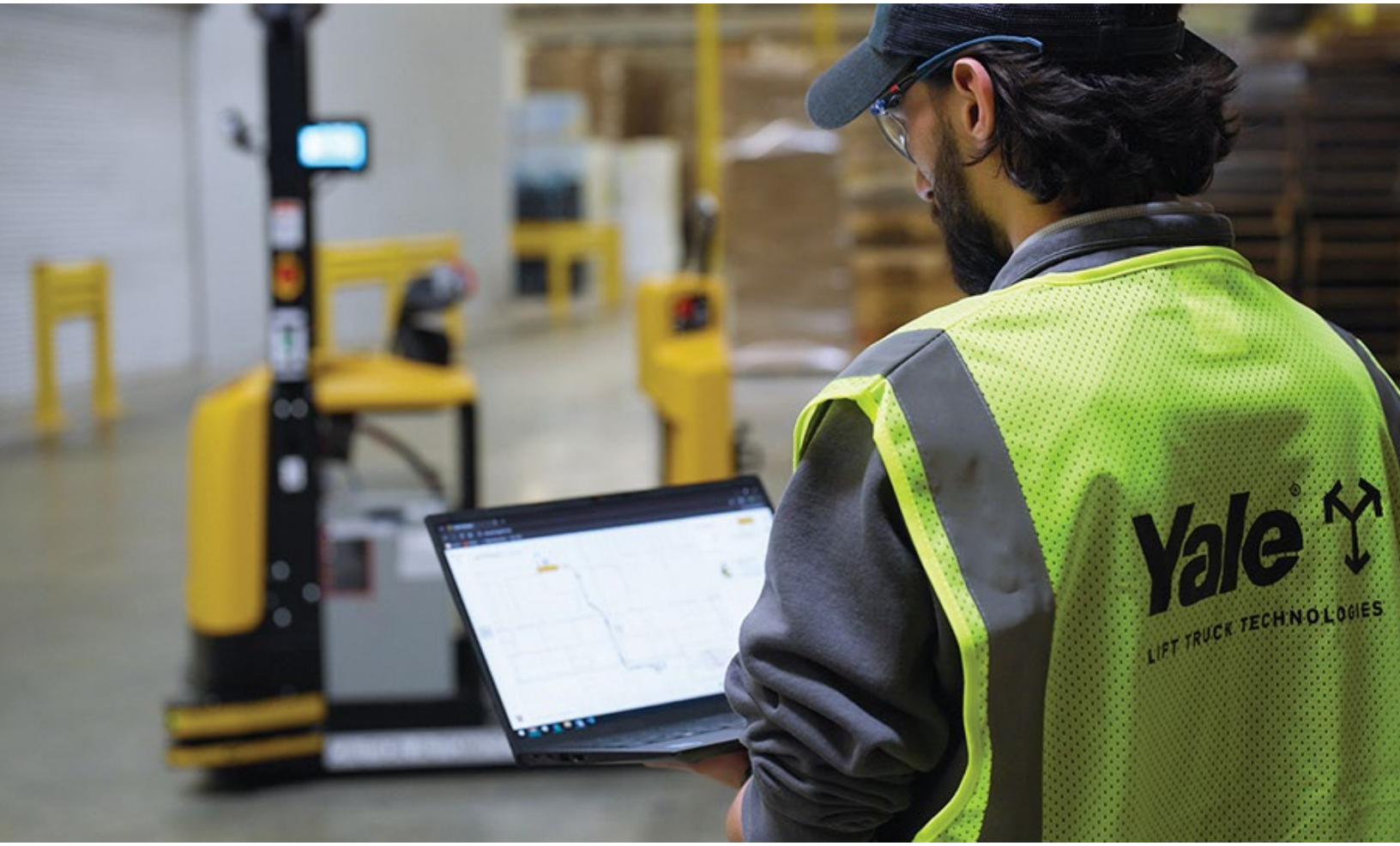
Integration and ease of use have often been sticking points for businesses looking to automate warehouse operations. Traditionally, automation systems have required extensive upfront engineering and custom code to program autonomous lift trucks. Changing routes, adding trucks to the fleet and integration with basic warehouse systems such as fire alarms or with warehouse management systems (WMS) also typically required operations to call in an outside expert or maintain a trained software engineering staff to re-program the trucks.

The average salary of a software engineer in the warehouse industry is $100,181/year ($48.16/hour)

Modern automated lift truck technology is moving toward systems that allow operations to bypass this need for costly engineering support, both in the up-front implementation and for day-to-day changes. Rather than coding, the software portals used to manage some automated lift truck systems today rely on intuitive, drag-and-drop functionality. This shift in how users interface with the governing software makes it much simpler to deploy and use automated lift trucks. It allows an average supervisor to implement automated lift trucks quickly and monitor or alter their performance easily, even with multiple fleets across different facilities.

Navigation technology is another feature to consider when weighing startup cost and time. While traditional automated guided vehicles (AGVs) require installation of guidance infrastructure, automated lift trucks do not share this requirement. Using LiDAR and other sensing systems, they can map the facility and autonomously check their location against that map as they operate.

The type of automation and automation provider selected can also heavily influence startup timeframes and the simplicity of the deployment process. Some forklift manufacturers and other providers do not produce both the hardware, like a forklift chassis, and the automation technology themselves, but instead rely on another company to supply the component that they do not. For warehouses, this model can complicate the implementation, requiring more effort and coordination to sync project expectations, progress and schedules as opposed to working with a single provider with complete accountability for the outcome.



Aligning on the ROI

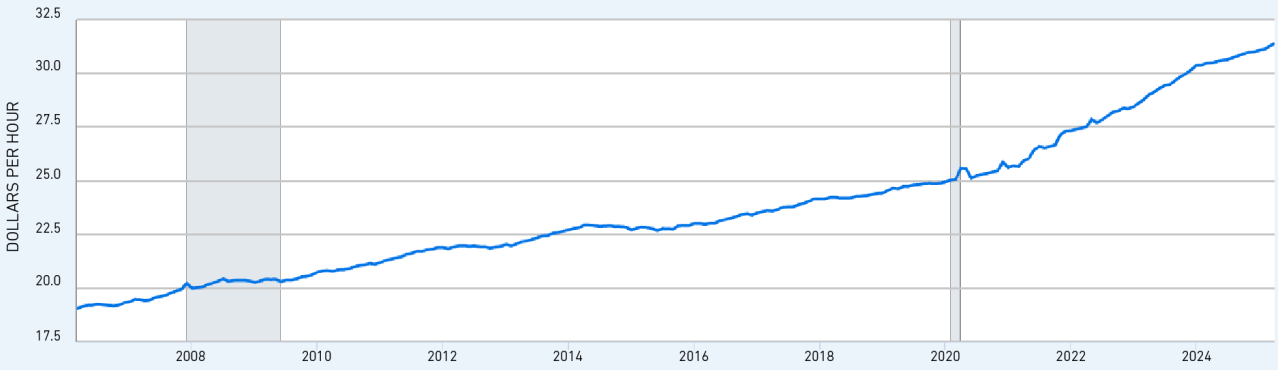
An important early step is defining success — in other words, what level of return is necessary to make the investment worthwhile, and over what timeframe?

Although there is a perception that automated lift trucks are expensive and require a significant up-front investment, some offer a clear ROI, and automation as a service (AaaS) and rental agreements can allow warehouses to automate without a large capital outlay or hidden costs. The financial flexibility of these models, with all costs rolled into a single monthly or annual fee, can enable operations to pilot just one or two trucks, rather than a full fleet pilot that might otherwise be required to justify a large capital investment in long-term equipment ownership. Return on AaaS investments can also come more quickly than many operations may think possible. Some two- and three-shift applications can see a ROI within months or days. While multiple shifts are not a necessity for these automation arrangements to produce a financial upside, large, 24/7 operations that are able to reallocate multiple operators may even be cashflow positive from day one.

When automating processes and calculating the associated payback, direct labor savings are obvious wins, with reduced expenses on hourly wages, overtime and holiday pay rising to the top. As warehouse wages continue to rise over time, automation costs become not only more predictable but more affordable relative to labor costs.

Determining and weighing the fully burdened labor rate against the cost of automating is key to understanding which approach makes financial sense. However, hourly labor rates are not the full story. Automation can help drive savings in other indirect ways by potentially reducing costs associated with retraining and re-education, workers' compensation and lost time due to illness or injury. In industries like warehousing where average employee turnover is high, finding and replacing employees also involves considerable time and expense. Meanwhile, inexperienced operators are more prone to cause costly damage to the facility, equipment and product.

INCREASE IN WAREHOUSE HOURLY EARNINGS 2006 – 2025



*Shaded areas indicate U.S. recessions.

Source

Beyond initial implementation: Keeping the future in mind

With fluctuating demand and a constantly evolving warehouse environment, automation investments must have the flexibility to meet the challenges of today…and tomorrow. For example, automated lift truck systems that can be easily updated with new routes to accommodate warehouse layout changes and workflows, add new trucks to the fleet, and other changes as business dictates.

But the adaptability of individual automation investments is only a piece of a complete plan for the future. Support networks and service capabilities are variable across different types of automation providers, so it is important for warehouses to understand how the solution is supported on an ongoing basis and whether a single, local provider for training, parts and service is a requirement for their business. With some solutions, the automation system and the lift truck might be serviced and warrantied by separate companies, making it more difficult to understand which party to go to for troubleshooting, repairs or maintenance. Not all automation providers have local service networks either, so customers may instead rely exclusively on remote support or have to wait for personnel to travel to their facility.

Beyond the initial implementation, operations should think of automation as a phased journey. Both the challenges that drive businesses to look for automated solutions and the capability and cost of automated lift truck technology keep evolving. Incorporating automation into long-term strategic planning discussions can position operations to achieve future competitive advantage while also providing a framework for adaptation should conditions change, with the flexibility to accelerate timelines or adjust plans to fit the needs of the business.

Automation professionals from Yale can help you navigate the road to adopting automated lift trucks for your operation. Visit us online to learn more.

© 2025 Hyster-Yale Materials Handling, Inc., all rights reserved.
Yale and ⅄ are trademarks of Hyster-Yale Materials Handling, Inc.

0025VETZWP004_E_EN-US_V3R0_051525