The ROI of robotics: Financial and operational sense

How robotic material handling solutions help address labor issues, control costs and drive greater efficiency, productivity and reliability

Yale Materials Handling Corporation

Gone are the days when self-driving vehicles were confined to science fiction and bold predictions of the future. Autonomous technologies have blossomed into well-developed, ready-to-deploy solutions.

One of the most competitive arenas for this development is the automotive market, with ride-sharing companies and auto manufacturers alike pouring funding into development and establishing pilot programs for autonomous cars. And just as technology like LiDAR enables self-driving cars to 'see' the road, so too can it allow vehicles to 'see' inventory aisles, conveyor lines and other warehouse infrastructure.

Manufacturing and distribution centers have a history with driverless vehicles, using traditional automated guided vehicles (AGVs) in select applications for decades. With technology advancing and adoption in the materials handling industry growing, this white paper examines the evolution of robotic technology and the financial and operational forces driving greater adoption.

Justifying the next-gen investment

Early materials handling AGVs required extra infrastructure like ground wires, tape, magnets and reflectors to navigate fixed routes. But today's robotic lift trucks do not require any infrastructure and can adjust routes on the fly. This offers great strides forward in terms of flexibility, ease of use and productivity.

Translating these qualities from theoretical benefits to tangible reality is key, as the business climate requires a reasonably fast return on investment (ROI). The more shifts an operation runs, the sooner they can reap a full return on their robotic lift truck investment – oftentimes two years or less for multishift operations.

The autonomous supply chain

2021

Number of robots deployed in warehouses and manufacturing facilities will reach 620,000 in 2021, up from 40,000 in 2016

Source

2024

Over 74% of supply chains are expected to adopt robotics by 2024

Source

2021

Global logistics and warehouse robotics market expected to reach $14.43 billion by 2021

Source

2025

Robots will be installed in more than 50,000 warehouses by 2025

Source

Augment a stretched labor market

With unemployment at a 50-year low, U.S. warehouses consistently struggle to find workers. The numbers support this, with 65 percent of respondents to the 2019 MHI Annual Report citing difficulty hiring and retaining workers as their biggest obstacle. Moreover, supply chain job openings are growing faster than any other part of the economy, with industry growth outpacing the labor pool by a rate of six to one.

But while quality labor is hard to find, it's even more difficult to retain. According to a survey by ARC Advisory Group and DC Velocity the majority of respondents reported turnover in the double digits, with over a fifth reporting turnover between 25 and 50 percent. Filling newly vacant positions can cost anywhere from 25 to 150 percent of the employee's salary and it often takes over a month for new hires to reach peak productivity.

Nevertheless, the work must get done. As companies look to contain costs and reconcile growing demand with the realities of the labor market, considering robotics as part of strategic workforce planning can help bridge the gap.

"It's not meant to replace human labor, but you can get greater throughput with the same size workforce," said John Santagate, analyst with IDC Manufacturing Insights, in a Wall Street Journal story.

Using automated solutions like robotic lift trucks can help managers address the labor shortage and free employees to advance to more engaging, meaningful positions – helping curb turnover.

Comparing cost and performance

Human employees	Robots
Cost about $30 per hour, fully burdened Source	Cost about $7-12 per hour*
Take vacations, have sick days and require breaks	Work 24 hours a day, 7 days a week, 52 weeks a year
Potential for operator error	Follow all safety protocols
Require extensive training	Travel optimized routes at consistent speeds

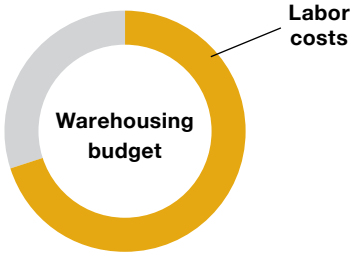
*Range based on expected operating cost of approximately $6 / hr, plus $4.50 / hr in maintenance.

More uptime, more productivity

SKU proliferation and the desire for faster delivery times add further complexity and have defined a new "normal" for supply chains. Services that were once considered perks, like free next-day or two-day shipping, are now an expectation for every e-commerce order. With speed and short order cycle times so important and competition only a click away, businesses have zero tolerance for downtime, and even minor interruptions can have a severe impact.

Automation is a reliable solution to minimize the risk of downtime and unexpected delays. A robotic lift truck does not need to take time off, relentlessly working 24/7 and only stopping for battery replacement. And to top it off, robotic lift trucks follow the rules of the road – which can reduce impacts that cause service interruptions and improve equipment longevity.

Labor costs can account for 50-70 percent of warehousing budgets.



Do you have the technology to get the most out of your labor investment?

Source

Automation can also bring out the best in employees. Fostering "cobotics," with humans working alongside robots, leverages the strengths of both to make processes more efficient. For example, using automated systems to move inventory to employees can boost labor efficiency and throughput.

Lower long-term costs and investment

When automating processes and calculating the associated payback, direct labor savings add up, with expenses like hourly wages, overtime and holiday pay. But automation drives savings in other ways by helping drastically reduce costs associated with:

- Retraining and re-education
- Insurance
- Workers' compensation
- Lost time due to illness or injury

"Automation will likely continue to become less costly, while wages and benefits for human workers will increase over time."

– Material Handling and Logistics U.S. Roadmap 2.0

Efficient route planning and adjustment

Introducing a robotic lift truck into a facility starts with walking the truck through the space to build a map and learn the main routes, storage aisles and other characteristics. The robotic software uses this information to find the most efficient routes and respond in real time to obstructions and shifting traffic volumes, converting to alternative paths as needed.

What a single truck sees can be shared with the rest of the robotic fleet. For example, if one robotic lift truck encounters a delay-causing obstruction, it can inform other units so they find alternate routes. This is a huge leap from traditional AGVs, which were not only restricted by extra navigation infrastructure, but lacked on-board intelligence to adapt to obstructions, leading them to simply stop and halt throughput.

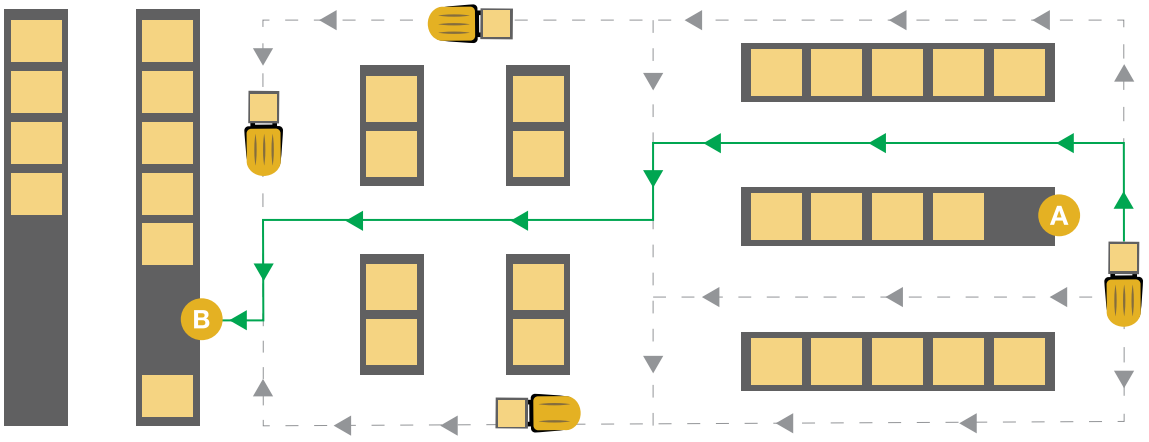
Modern, infrastructure-free navigation and route planning intelligence enables robotic lift trucks to easily adapt to layout adjustments due to changing inventories and workflows. Efficient routes and coordination between robotic lift trucks also balances the flow of traffic, relieving congestion that causes unexpected delays and downstream issues like missed shipments.

Reduced mishaps and maintenance costs

According to the Occupational Safety and Health Administration (OSHA), businesses spend about $170 billion per year on costs related to occupational injuries and illnesses – expenditures that come directly out of company profits. Automated solutions like robotic lift trucks can help reduce the risk of:

- Operator mishaps
- Damaged equipment
- Out-of-budget repairs
- Premature replacement
- Need for backup vehicles to avoid lost throughput

From Point A to Point B



Additionally, robotic lift trucks comply with ANSI standards, abide by posted speed limits and follow site-specific safety protocols. They can stop and adjust to unexpected obstructions, including ground level impediments or obstacles suspended in midair, like a ladder sticking out of a storage area.

Compared to traditional AGVs, robotic lift trucks offer much lower costs to handle routine maintenance and resolve unexpected issues. Since they are simply standard lift trucks with robotic technology added, the same local dealer personnel can provide service without the downtime and expenses that come with calling in specialized technical resources.

Improved product flow with data flow

The Industrial Internet of Things (IIoT) has already changed the way people do business, revealing new opportunities for improved productivity and profitability.

Interfacing robotic lift truck management software with a WMS or ERP system enables valuable communication to connect data points and make real-time adjustments. Combined with telematics systems, robotic lift trucks offer unparalleled visibility into overall processes and individual units, enabling adjustment and ongoing optimization based on usage, congestion, maintenance and other data. For example, operations can adjust fleet size and composition to ensure the best configuration for their needs, while coordination among software systems can enable robotic lift trucks to proactively acknowledge required battery replacements or preventive service.

Conclusion

Autonomous solutions like robotic lift trucks drive proven cost savings by increasing labor efficiency, reducing turnover, extending asset life and increasing throughput. But what solidifies them as a smart investment is their flexibility and ability to adapt as operations evolve.

For more information on how robotic lift trucks make sense contact a solutions expert.

Less land? Look up!

Rapid urbanization shows no sign of slowing down. As millennials continue flocking to cities, competition for their spending power also increases. Driven by demand for greater variety in growing urban markets, operations must add more storage aisles to house more inventory. But with commercial land costs in mind, simply adding warehouse space is cost prohibitive. Operations must make greater use of space that is available – building up, rather than out.

In these applications, automated transportation solutions must be able to do more than horizontal transport. The Yale MC10-15 counterbalanced stacker and Yale robotic reach truck allow operations to maximize vertical storage space ranging from second and third levels to as high as 30 feet – no operator required.