



# The ROI of Robotics: Financial and Operational Sense

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



## Abstract

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 self-driving car market, with most major auto manufacturers staking a claim. In October 2016, Tesla announced that all vehicles it produces will be equipped with the necessary hardware for [full self-driving capability](#). The rigorous, large-scale commitment from Tesla and other big-name automotive companies has been a principal driver behind accelerating autonomous capabilities. According to the Material Handling & Logistics U.S. Roadmap 2.0, “As soon as 2026, some expect that [90 percent of new vehicles will be autonomous](#).”

The supply chain is another obvious target for the autonomous transportation revolution. A 2016 McKinsey report suggests that autonomous ground vehicles will account for [80 percent](#) of final-mile deliveries within 10 years. Autonomous technology also has a presence in manufacturing facilities and distribution centers, where automated guided vehicles (AGVs) have been used for decades, and will continue to penetrate the materials handling industry as technologies advance.

This white paper examines the evolution of robotic technology and autonomous load transportation solutions, and the value drivers spurring their adoption.

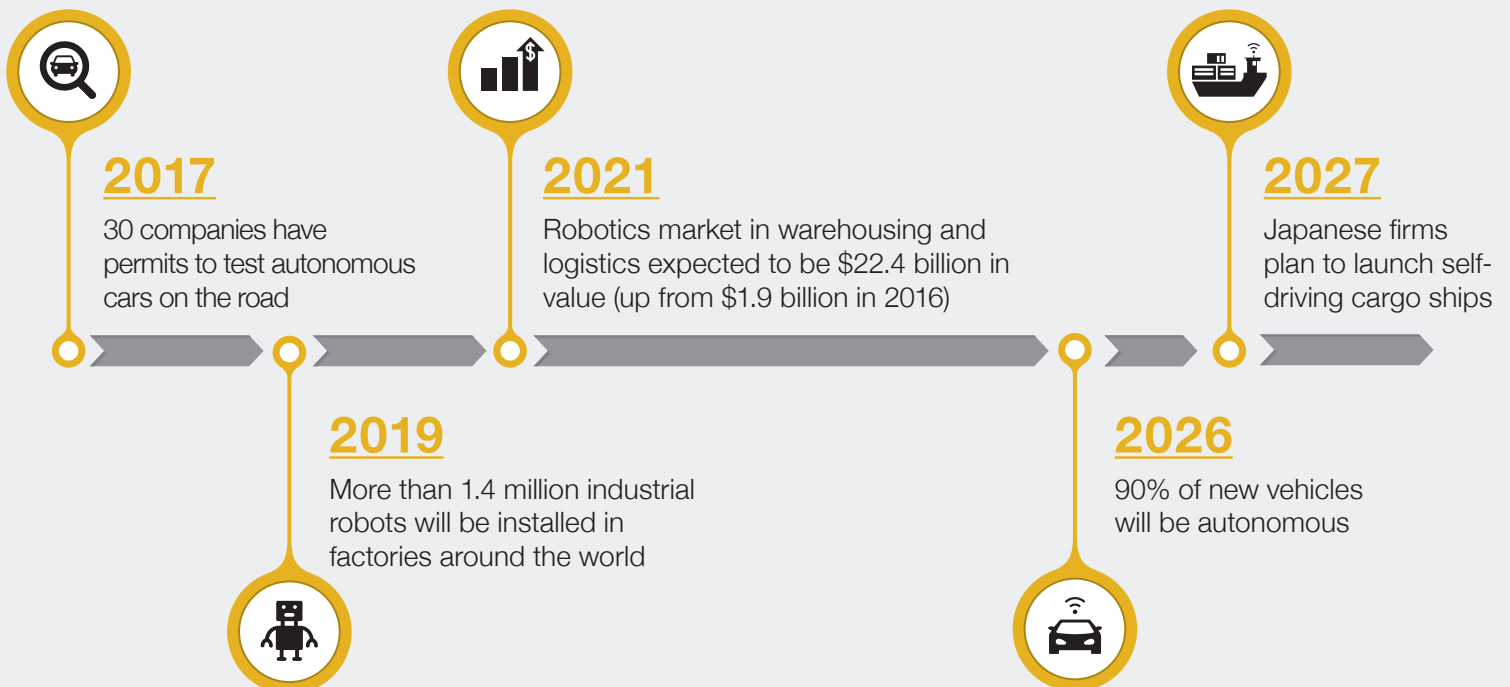


### Justifying the Next-Gen Investment

Early materials handling AGVs relied on ground wires, tape, magnets and reflectors, but today's robotic lift trucks operate without any added infrastructure and are unrestricted by fixed routes. This offers great strides forward in terms of flexibility, ease of use and productivity. For example, Yale® robotic lift trucks equipped with Driven by Balyo technology build a map of the facility and self-locate in real time, navigating infrastructure free and easily responding to unexpected obstructions.

As the competitive landscape continues to intensify, materials handling operations cannot afford an investment that does not pay off, so translating these benefits from theoretical to tangible reality is key. The business climate also 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 less than two years for two- or three-shift operations.

## The Autonomous Revolution





## Reduced Turnover and Training Time

According to the Bureau of Labor Statistics, the turnover rate for warehouse workers is 36 percent. Moreover, filling newly vacant positions can cost anywhere from 25 to 150 percent of the employee's salary.

Though training periods can vary based on the nature of the job, one thing remains constant—training inexperienced or unskilled employees is costly. Companies like Amazon have used automated systems to reduce the time it takes to train employees, bringing new hires up to speed in as little as two days using technology like touch screens and robots.

Adopting automated transportation solutions like robotic lift trucks can help simplify tasks reserved for employees. For example, in goods-to-operator fulfillment workflows, employees do not need to know the storage location for inventory required for each order; rather, they can focus on picking and packing orders as quickly as possible from the inventory brought to them by a robotic solution.

Implementing robotic lift trucks does not take away high-value added jobs from human workers. In fact, U.S. warehouses had 600,000 unfilled jobs as of May 2017. 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.

## Consistency and cost savings

### Human employees:

- Cost about \$12 per hour
- Take vacations, have sick days and require breaks
- Potential for operator error
- Require extensive training

### Robots:

- Cost about \$0.75 per hour
- Work 24 hours a day, 7 days a week, 52 weeks a year
- Follow all safety protocols
- Travel optimized routes at consistent speeds

### Costs over time





## More Uptime, More Productivity

Supply chain operations are under pressure to get more done in less time with fewer resources. SKU proliferation and the desire for faster delivery times add further complexity and have defined a new “normal.” Services that were once considered perks, like free two-day shipping, are now an expectation for every e-commerce order.

This demand triggers a radical shift in operations, as more than **40 percent** of respondents in the Zebra 2020 Warehouse Vision Study cited shorter delivery times as a driving factor for warehouse overhaul. In this environment, businesses have zero tolerance for downtime, and even minor interruptions can have a severe financial impact.

**A study by Information Technology Intelligence Consulting found that 98 percent of organizations across several industries say that a single hour of downtime costs **over \$100,000.****



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; instead, it works relentlessly 24/7 and only stops for battery replacement. And to top it off, robotic lift trucks always follow the rules of the road – which can reduce impacts and interruptions, and improve equipment longevity.

Robotics can also bring out the best in employees. Fostering “cobotics,” with humans working alongside robots, leverages the

strengths of both to make repetitive tasks and more complex, value-added functions more efficient. This can provide new opportunities for people with physical limitations, like limited mobility, to serve as integral parts of certain processes, such as using automated systems to move inventory to pickers, helping keep throughput flowing.

## Lower Long-term Costs and Investment

When automating processes and calculating the associated payback, direct labor savings are obvious wins, with expenses like hourly wages, overtime and holiday pay rising to the top. But automation drives savings in other indirect ways by drastically reducing costs associated with:

- Retraining and re-education
- Insurance
- Workers’ compensation
- Lost time due to illness or injury
- Long-term wage increases

Robotic lift trucks require limited ongoing investment, and have the ability to scale up to meet new challenges or production demands with expanded capabilities and software updates.

**“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 responds in real time to obstructions and shifting traffic volumes, converting to alternative paths as needed.

For example, if one robotic lift truck encounters a delay-causing obstruction, it can inform other units so they can find alternate routes. This is a huge leap from traditional AGVs, which were not only restricted by extra navigation infrastructure, but also lacked on-board intelligence, leading them to simply stop in the event of an obstruction and bring throughput to a halt.

Modern infrastructure free navigation and route planning intelligence enables robotic lift trucks to easily adapt to layout adjustments, as operations accommodate changing inventories and workflows. This also helps

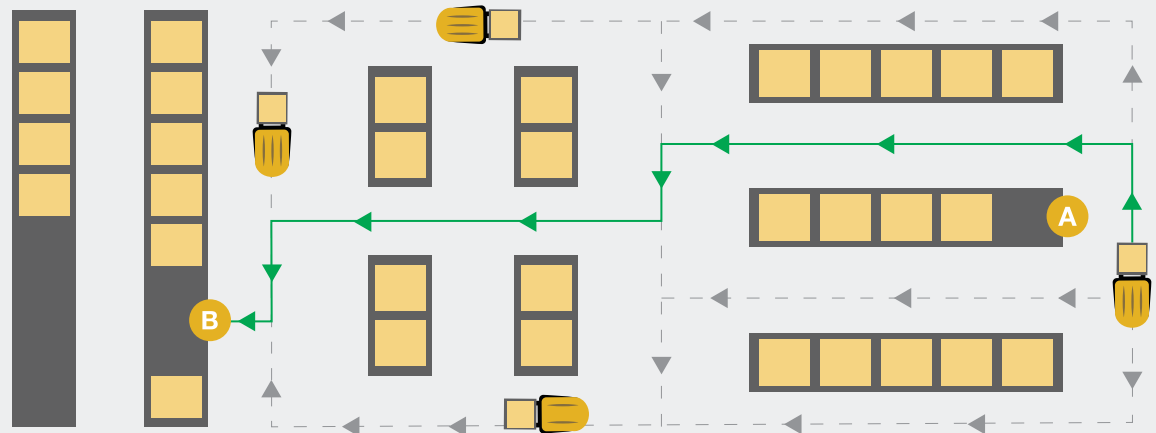
meet sustainability goals. Units traveling along the most efficient routes from point A to point B can minimize energy usage. Efficient routes and coordination between robotic lift trucks also balances the flow of traffic, minimizing congestion that causes unexpected delays and downstream issues like 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. Robotic lift trucks help provide a safeguard against operator error which reduces 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.

And compared to traditional AGVs, robotic lift trucks offer significant cost savings when it comes to unexpected service and routine maintenance. 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 specialized technical resources.



**How many worker injuries occur each year in lift truck accidents?**

**Nearly 100,000** due to improper training or carelessness.



## 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. This enables practical accommodation for manual intervention, minimizes ongoing costs in the event of minor layout adjustments and the need to supplement future initiatives like [Industry 4.0](#). For more information on how robotic lift trucks make sense contact a solutions expert at [your local Yale® dealer](#).

## 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. The winning play is to 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 Driven by Balyo can lift and lower up to three levels, giving operations the ability to stack and unstack loads from elevated spaces, deposit or remove pallets from conveyors, shrink wrapping or palletizing stations – no operator required.

