



Yale[®]
robotics.



Lift efficiency with robotic trucks.

In today's ever more competitive business environment, the pressure is always on to deliver greater productivity levels and quicker delivery times.

Yale® robotic trucks not only provide the increased efficiency you're looking for, but also frees up your existing workforce to add more value to your operation.

By deploying robotics you can reconfigure your warehouse to reduce operating costs, increase operational efficiency and minimise accidents and damage to goods. Robotics are ideal for performing repetitive tasks such as movement of pallets in the warehouse environment and loading and unloading.



Laser scanning system for navigation.

Tomorrow's technology here today.

The geoguidance navigation technology at the heart of our robotic trucks is based on a simple principle, trucks learn and recognise the uniqueness of the warehouse.

On-board navigational intelligence means that trucks calculate the most efficient paths between points, and can reroute to avoid congestion. Trucks are able to co-ordinate with traffic management software to optimise routes and utilisation, and reduce congestion.

Equipped with LIDAR (Light Imaging Detection and Ranging), a laser scanning system dedicated to navigation, our trucks navigate by recognising structural features such as walls, building columns or racks. They use these features to self-locate and transport loads throughout your warehouse, so there is no need for tape, wires, reflectors or magnets to aid guidance.

Putting your environment on the map

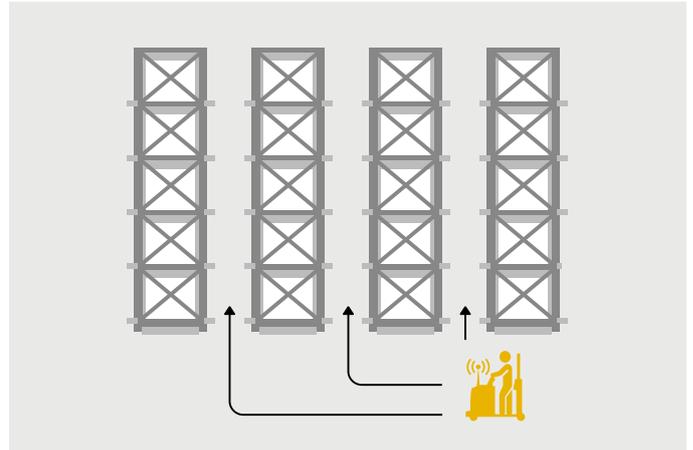
Stage 1: As an engineer manually moves the robot truck around, it uses the truck navigation radar to record the building environment and transcribe it into a 2D map.

Stage 2: The map is refined by the installation engineer. Virtual routes with pick-up and placement points are added to this reference map and the on-board navigational intelligence on the trucks calculates the most efficient paths between points.

Stage 3: This reference map is integrated into the robot's computer and compared with what it sees in real time via its laser scanner, enabling it to self-locate and move.

The Yale® robotic truck line-up includes the MO25 low level order picker, the MO50-70T tow tractor and the MC10-15 counterbalance truck.

Flexibility is key. Whether you want to automate a single truck or an entire fleet, whatever your operational demands, this scalable automation solution can meet your most specific requirements, allowing you to reap the benefits of reduced operating costs and maximum reliability.



Stage 1 – Engineer manually moves the robot around the warehouse.



Stage 2 – Map from the warehouse is 'cleaned up' to create virtual routes.



Stage 3 – Reference map is integrated into the robot's computer.

Navigate your way to greater efficiency.

The robot navigation laser

Maps routes and guides the truck throughout the facility

Curtain laser

Detects above ground level obstacles and stops the truck when interrupted

Visual and audio warning indicators

Alerts workers and pedestrians that the truck is coming or if an issue arises

Emergency stop buttons

When activated the truck stops

Pedestrian awareness light

Provides an additional visual notification that the truck is motion

User interface touch screen

When necessary, allows workers to dispatch the truck or assist in locating virtual paths

Chassis-first laser scanner

Laser has two fields. Warning and STOP (also called Safety). Breaking the warning field will slow the truck down. Breaking the STOP field will stop the truck. If the obstacle is cleared, the robotic can automatically re-start in all cases for the warning field and some for the STOP field

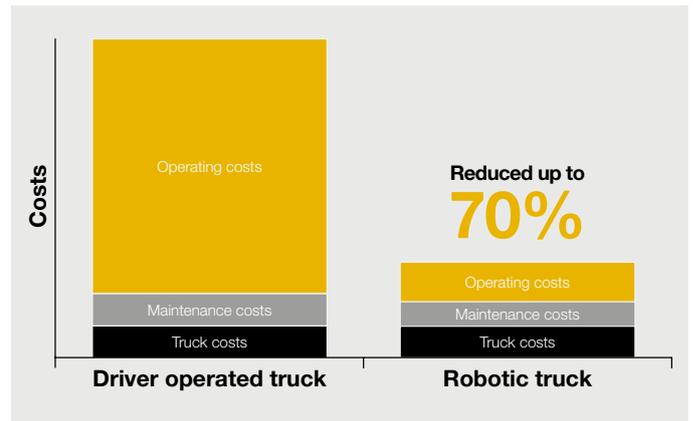


Increased robotic automation equals reduced operating costs.

Higher efficiency, lower costs

The use of robotic trucks allows you to perform repetitive tasks such as movement of pallets in the warehouse environment, and loading and unloading in a more cost effective way – saving you time and money.

Not only will they improve productivity, picking up, transporting and dropping off pallets independently and reliably, an automated operation may also aid in reducing product damage and accidents.



Switch to manual

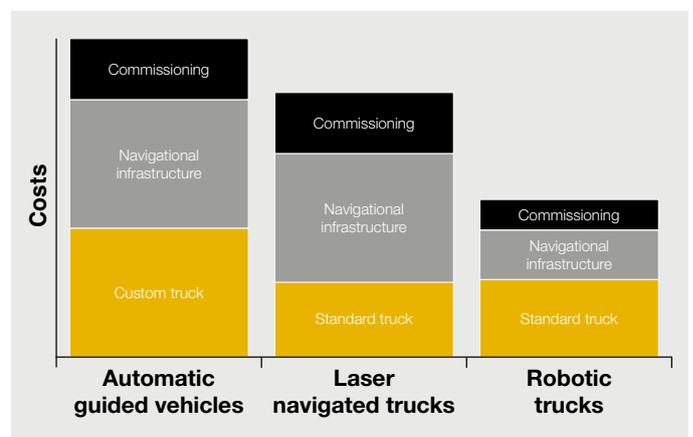
At the touch of a button or a movement of the tiller, you can seamlessly switch your robotic truck to manual mode.

This allows you to have the benefit of both robotic and manually operated trucks; your trucks can be redeployed for manual tasks such as picking, loading/unloading and then simply returned to automated tasks when required.

The advantages of robotic trucks

Robotic trucks offer a number of key cost advantages over conventional automatic guided vehicles (AGVs) and laser navigation trucks.

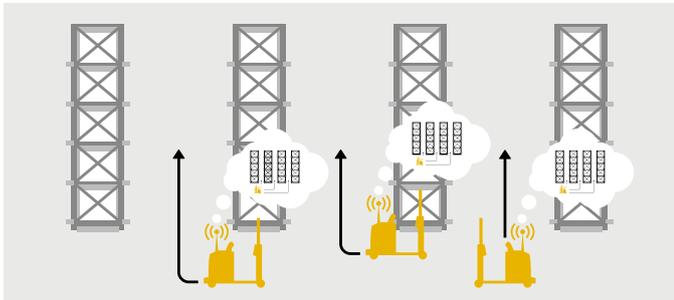
Yale robotic technology can be added to standard models of the MO25 Low level order picker, MO50-70T Tow tractor and MC10-15 Counterbalance stacker.



Flexible in operation. It changes when you do.

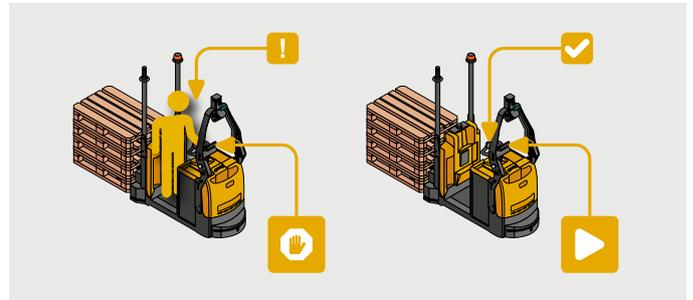
Thanks to scalable automation, our robotic lift trucks offer a unique level of flexibility in use, accommodating any changes in demand and constantly shifting traffic patterns.

Effortless integration



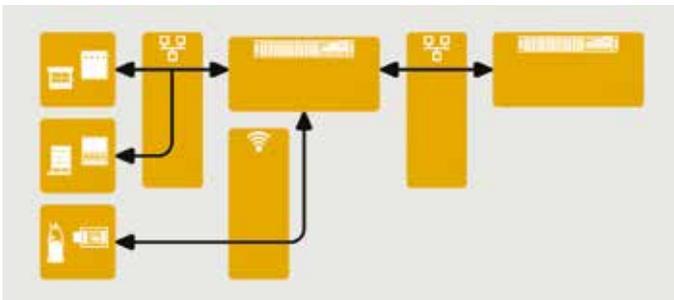
The geoguidance navigation technology works without the need for dedicated infrastructure, enabling it to integrate easily into existing operations. It simply maps the physical features and structures to self-locate and navigate, which means it's quick and easy to modify or create entirely new paths when there are changes to the environment, or to the missions that your robots are required to complete.

Take control when you need it



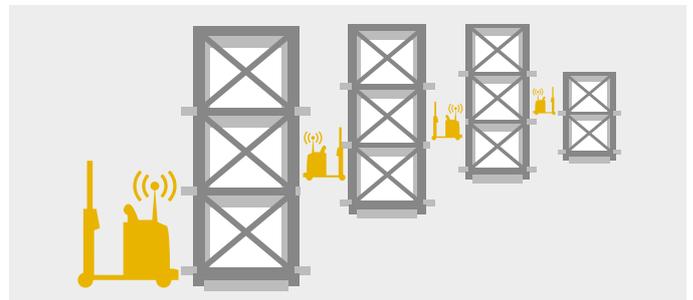
By switching from automatic mode to manual mode at the touch of a button, or movement of the tiller, the robotic lift truck can easily accommodate changing operational needs, giving the operator the opportunity to take control when appropriate and perform other tasks as and when required.

Real-time truck management



With our robotic truck manager software, it's possible to control traffic, assign orders to individual trucks and interface with systems such as ERP (Enterprise Resource Planning) and WMS (Warehouse Management System) or equipment such as automatic doors, conveyors and production machine.

Autonomous decisions in real time



Our robotic trucks locate themselves in real-time, perceiving and interacting with the environment.

The Yale Robotics line up.



MO25 internal transportation

- Cost efficient horizontal transfer
- Regular, sustained constant flow
- Horizontal transport over short and long distances
- Stock replenishment and material hauling



MO50-70T tow tractor

- Standard trailer handling configurations
- Horizontal transport over short and long distances
- Brings individual items together to be supplied as one unit
- Stock replenishment and material hauling

Winner
of the Materials
Handling Product
News Readers' Choice
product of the
Year award.



MC10-15 counterbalance stacker

- Deposit or remove pallets from 2nd level
- Handle smaller width pallets
- Stack or unstack loads
- Deposit or remove pallet from shrink wrap station

The robotic technology at the heart of Yale robotic trucks is the result of 10 years' research and development in mobile robotics by Balyo. It enables fleets of robotic trucks to self-locate in real time and navigate inside a building with no added infrastructure, unlike other automatic trucks or AGVs.

This solution is fully connected to the customer environment and can be easily integrated into current industrial and logistics processes. For greater simplicity, Yale robotic trucks can also be used manually, enabling operators to regain control to perform a task at any time.

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BY **BALYO**

About Yale[®]



Yale is a leading global manufacturer and supplier of high-quality counterbalance forklift trucks, warehouse equipment and fleet solutions. 'People, products and productivity' sums up our approach to the materials handling business. With over 140 years' experience, we are proud of our reputation as an innovative, forward-thinking manufacturer.

Yale dealerships provide flexible truck servicing solutions and are linked to one of the industry's most sophisticated parts distribution operations. You'll find support for Yale forklifts throughout the EMEA region – provided by a big regional footprint stretching through Europe, Middle East and Africa.

Materials handling for:



Automotive



Beverages



Chemical



Construction



Food



Logistics



Metals



Paper



Retail



Wood

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