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WHITE PAPER

The new norm: How COVID-19 has accelerated the switch to robotic automation in logistics and distribution



Understanding the new norm in the logistics supply chain and the business case for accelerated adoption of flexible automation

The new norm: How COVID-19 has accelerated the switch to robotic automation in logistics and distribution-EN_06.2021

Foreword

While the COVID-19 pandemic has had a significant impact on almost every aspect of life, it has dealt a particularly hard blow to the retail sector. From shops being forced to close through to supermarkets struggling to fulfil demand for online delivery, the pandemic has led many businesses to revisit their selling and distribution structures and reconsider their attitudes to using and investing in technologies that could help overcome many of the challenges they now face.

Supply chains and logistics have had to undergo fundamental transformation as a consequence of the coronavirus. The pandemic's rapid global spread presented significant challenges not just in terms of its human impact but also its considerable commercial effect, leading companies to find ways to adapt their business models both to survive and to become more resilient to similar shocks in the future.

Our own research provides evidence of the impact that the pandemic has had on companies in the sector. In a recent global survey of logistics and transportation companies carried out by ABB, 91.5 percent of respondents said that their operations had been impacted by COVID-19, requiring

them to adjust their processes to compensate for issues such as staff absence caused by factors such as self-isolation and social distancing, whilst also meeting massively increased demand for a diverse range of goods caused by the dramatic explosion in online ordering and home deliveries arising from the coronavirus.

It is also important to remember, however, that the sector was undergoing considerable changes even before the pandemic. The explosive rise in e-commerce that was taking place in particular was already leading to companies re-examining their existing bricks and mortar operations as customers opted to do their shopping from home rather than venturing into stores. In effect, COVID-19 has acted as a catalyst for change, speeding up a transition that was already starting to take place.

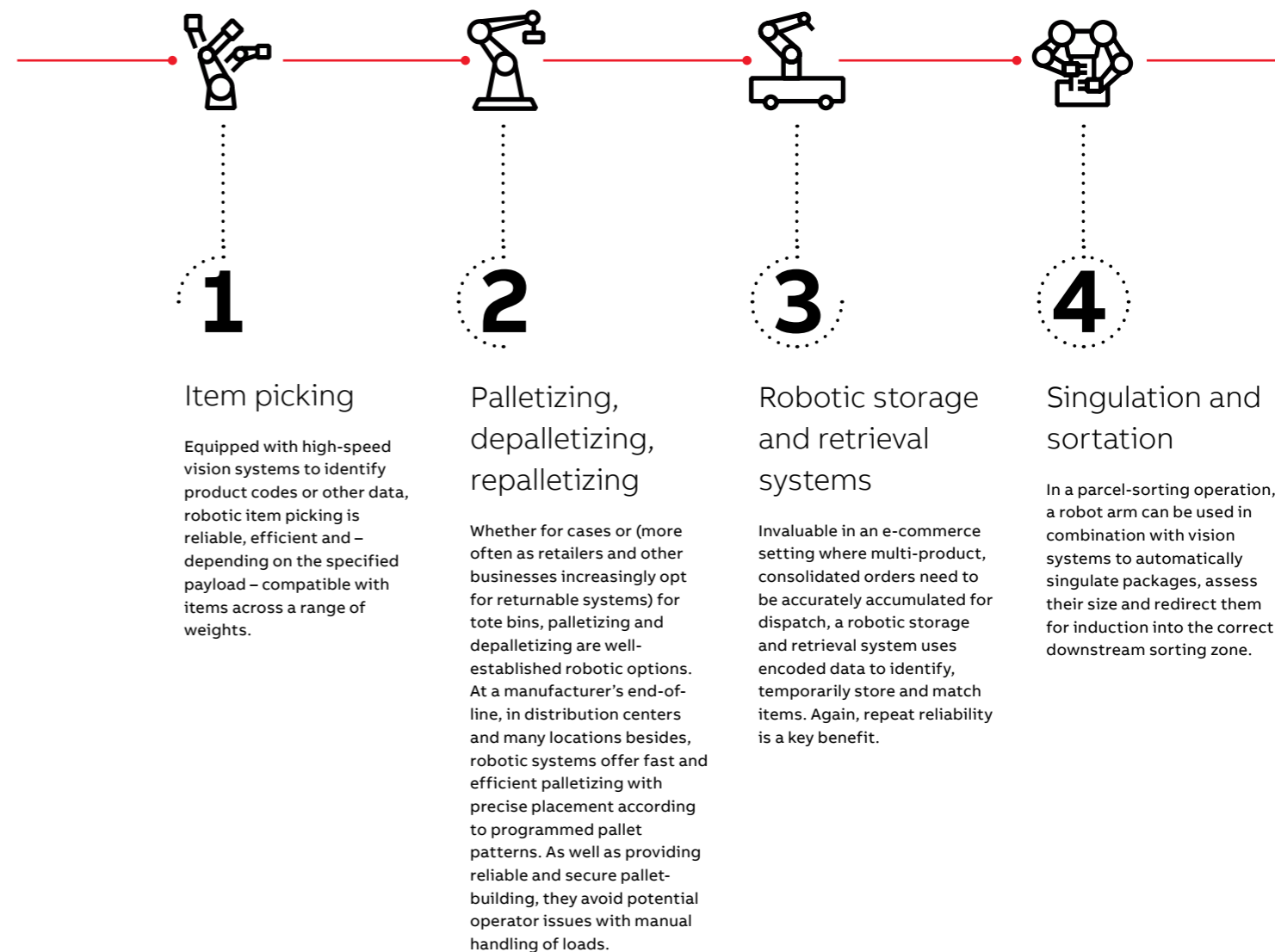
This white paper will look at the main challenges facing logistics operators at the current time and will explain how they can be overcome by using flexible automation. It will also look at some examples of real logistics applications where robots have been deployed to handle key tasks and will provide tips for assessing which tasks can be automated and how to proceed with automating them.



How can automation transform logistics performance?

Four ways that robots are transforming logistics operations

Whether as part of an FMCG end-of-line operation, retail distribution center, e-commerce fulfilment site or parcels-sorting facility, robotic automation offers a wide range of functions. Four key areas of product handling and sorting across these and other logistics roles are as follows:



Meeting the expectations of fast delivery of anything one can think of needs a logistics operation to match. For busy warehouses and distribution centers, robotic automation has been shown to deliver a demonstrable return on investment through increased efficiency, higher throughput combined with improved accuracy – and hence, fewer returns and improved customer satisfaction. It also offers flexibility as a way of future-proofing logistics operations against changes, not only in the level of demand but also in the form it takes and the channels it uses.

Building a more flexible future

The unprecedented lockdown due to the coronavirus has shown many logistics companies the importance of flexible systems, in ways many will not have previously thought of. Adopting these capabilities will also not necessarily add greatly to capital costs, while also offering the potential to achieve a significant competitive advantage.

Despite the huge changes brought by the pandemic, we must not lose sight of the fact that the flexibility of automation is more about the ability to evolve gradually, adapting to new ways of selling and delivering goods, while also maintaining more traditional retail routes. This flexibility may also be vital to adapt to the needs of the changing seasons or handle different unit sizes.

Choosing an experienced partner in logistics automation will mean that any equipment specified will take these future possibilities into account, while also keeping today's needs to the forefront.



The combined impact of lockdowns and changing consumer behaviour has hit traditional retail outlets hard.



Summary of key points:

- Robotic automation has been proven to deliver a demonstrable return on investment through increased efficiency, higher throughput, fewer returns, and improved customer satisfaction.
- Its inherent flexibility helps future-proof logistics operations against changes.
- Robotic automation is delivering improved performance in four key areas: Item picking, palletizing, depalletizing, repalletizing, Robotic storage and retrieval systems and singulation and sortation.

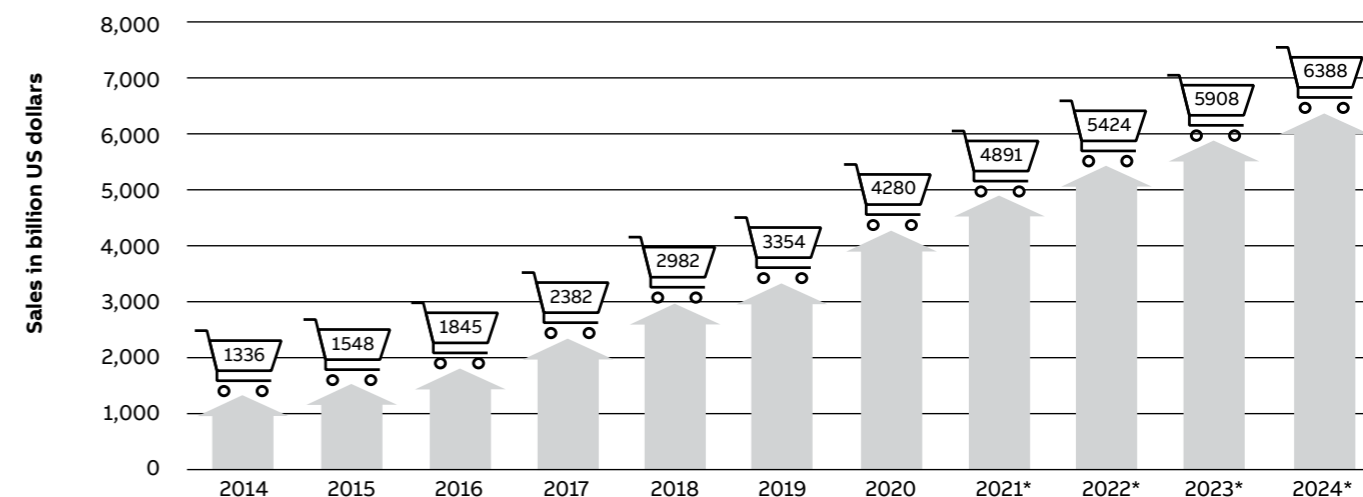
Trends affecting the logistics sector

While COVID-19 has forced companies to rethink and reshape their logistics operations, it is not the only factor at play. Prior to the start of 2020, both the retail and logistics

sectors were already contending with a move away from conventional store-based shopping as a growing number of consumers flocked to the internet to purchase goods.

Retail e-commerce sales worldwide from 2014 to 2024

in billion US dollars



In addition, shifts in global trade policy, the changing nature of consumer demand for bespoke products, and the expectation of next or even same day delivery were already leading forward-thinking operators to reappraise their approaches and look for new ways to tackle trends using the latest technologies.

The following are three key trends that have been influencing the shift to these technologies:

1. Workforce

Prior to COVID, workers in logistics and distribution centers were being faced with handling steadily growing numbers of orders as more people switched to e-commerce to buy and expanding range of goods. The need to alleviate this added workload imposed by this shift in consumer behaviour, together with a need to speed up fulfilment, was seeing a rise in the use of robotic automation to handle a range of tasks, from AGVs to move goods around warehouses through to the use of industrial robots to pick, handle and palletize goods.

This transition has been further accelerated by the impact of the coronavirus, which has had a severe impact on supply



chains, logistics and fulfilment, shutting down businesses and economies and exposing key structural weaknesses. In contrast to other disasters characterized by the physical destruction of buildings and infrastructure, it has been the impact on human health of COVID-19 that has wreaked havoc on supply chains. For many businesses, the nightmare scenario of a global pandemic combined with the economic impact of lockdowns that have prevented staff from producing, processing and delivering products and services have led to a realisation of the need for urgent change in order to ensure their future survival.

2. Omni-channel distribution

Describing businesses that sell across a range of channels including their own web sites, marketplaces such as Amazon, physical retail sites and social channels such as Instagram and Facebook, omni-channel distribution was already in full swing before the pandemic, with growing numbers of shoppers switching their preferences to online outlets. With the impact of the pandemic this move has accelerated considerably, particularly amongst younger consumers demanding convenience and fast delivery of a wide range of goods.

Part of this growth can also be attributed to conventional home delivery-based models becoming increasingly unviable, both financially and environmentally, as demand starts to outstrip the ability of distributors to fulfil it. At the start of the pandemic especially, many retailers struggled to fulfil home deliveries with their existing delivery infrastructure, requiring them to incur additional costs and hire extra staff such as drivers and couriers to meet demand. As many delivery vehicles are diesel-engined, there is the added element of increased pollution, which can incur additional costs in areas subject to emissions control charges.

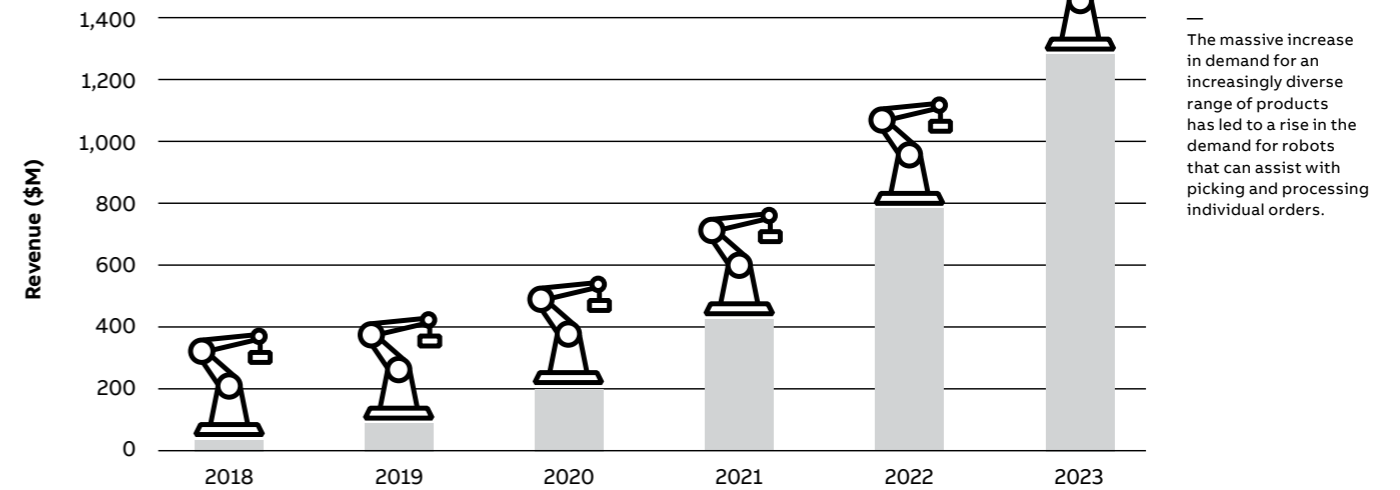
Omni-channel distribution has grown exponentially, leading retailers to rethink their distribution strategies to enable products to be shipped to customers either from their stores or from localized warehouses to shorten delivery times.

This same strategy is also being adopted by the general merchandizers, with Amazon declaring its intention to set up localized distribution outlets by taking over and repurposing vacant retail outlets in city and town center



A robotic order picking installation at Heemskerk's Rjinsburg facility in the Netherlands prepares orders according to each supermarket or food retailer's needs, so that the products can be cross docked directly onto supermarket shelves instead of being stored at distribution centers.

Warehouse piece picking robots market forecast



Notes: Revenues from picking robots within warehouses. Includes fixed, collaborative and mobile robots
Excludes revenues from software
Source: Interact Analysis

The massive increase in demand for an increasingly diverse range of products has led to a rise in the demand for robots that can assist with picking and processing individual orders.

locations¹. As an example of this, Amazon has recently ventured into the supermarket retail sector, opening stores that replace conventional cash tills with a smartphone app that automatically bills customers through their account and which enables them to collect other items ordered through the Amazon marketplace². As this concept catches on, it is increasingly likely that more retailers will review how their stores can be adapted to fit into an omni-channel distribution strategy.

3. E-commerce dominates

Already enjoying steady growth before 2020, the ascendancy of e-commerce over other shopping channels has been greatly assisted by the disruption caused by COVID-19. Figures from the OECD, for example, show that internet sales in the EU grew by 30 percent between April 2019 and April 2020, with similar shifts in other regions including the US, UK and China³. Growth in online grocery shopping has been especially strong. Reports from various industry consultants have long been predicting dramatic growth in demand for online grocery shopping services. In 2013, for example, a report by McKinsey⁴ identified the trend towards 'click and collect' – now commonplace – as being a major driver that would propel consumers towards online ordering and away from the physical shop floor. Interestingly, the report, which was based on feedback from 4,500 European consumers, also highlighted the need for retailers to do more to improve their supply chains to satisfy high demand resulting from a switch to online ordering, a lesson which has now been brought into sharp focus by the pandemic.

As a result, shortly before the COVID-19 outbreak, demand for warehouse automation, including robots, was being predicted by research house Interact Analysis to grow at a

compound annual growth rate (CAGR) of 12.6 per cent by 2023⁵. The research indicated strong growth in the adoption of piece-picking robots, with a predicted CAGR of 98.7 per cent due to expanding capabilities arising from developments in machine vision and gripping systems.

COVID-19 has had a devastating impact on physical retail globally, with sales volumes across all sectors falling dramatically in April. In the UK, for example, retail sales volumes fell by 18.1 per cent in April following a 5.2 per cent drop-off in March, across all sectors, with the stand-out exception being the pure e-Comm sector (non-store) with a record increase of 18.0 per cent.

The dramatic explosion in e-commerce since the start of 2020 has led to bumper results for some companies. Walmart, for example, saw a 97 percent rise in online sales, while Tesco reported a rise of 90 percent up to May after doubling its weekly delivery slots from 600,000 to 1.3 million in just five weeks. Not surprisingly there has also been a rise in the number of people being recruited to help service the extra demand for products. Collectively, the UK's seven leading supermarket chains have taken on 136,000 extra staff⁶, while Amazon has expanded its team by 175,000 people worldwide⁷.

This picture is reflected in other economies worldwide. In the US, footfall to physical retail outlets by October 2020 was 34.6 percent lower than the same point the previous year⁸, while e-commerce sales rose by 32.4 percent, from \$598.02 billion in 2019 to \$791.70 billion in 2020⁹.

How automation can help address logistics trends

If experience is a great teacher, then COVID-19 has provided a lesson in the value of being prepared. Most notably, the outbreak of the pandemic served to speed up the demise of many organizations that were already struggling to meet the changes in consumer behaviour and the growing trend towards demand-led consumerism, resulting in the disappearance of many well-known high street names and brands. Those that remain face a combination of challenges that are obliging them to look to new ways of operating, including investment in automation technologies, to remain viable.

1. Supporting the workforce

As business leaders move to put in place both short and long-term strategies to improve fulfilment and minimize the consequences of workforces being struck down by illness, many are looking to increase the implementation of automation and robotics in warehouses and distribution centers (DCs). If the supply chain is to achieve the speed, efficiency and resiliency demanded by today's complex markets, logistic companies will need to integrate automation, digital connection and edge technologies such as artificial intelligence and robotics. Achieving the successful integration of these technologies will be crucial to keeping supply lines open, both during normal conditions as well as times of crisis.

Given the current pressures facing today's supply chains, we can already expect to see an accelerated uptake of automation and robotics into the distribution network. There are likely to be more operations that operate completely autonomously. The greater changes though will come not in eliminating humans from distribution centers but rather replacing non-value-added movement with automation and robotics that can speed up processes and make them more efficient.

2. Managing the move towards omni-channel distribution

Omni-channel supply chains and their complex demands are well served by the capabilities of modern intelligent robots. With advanced navigation and traffic management systems and built-in sensors and scanners, autonomous mobile robots (AMRs) systems can find their way to any location in a warehouse, retrieving items and taking them to any desired destination.

AMR systems can work in a safe way with humans and other industrial vehicles. These abilities bring extra flexibility to the logistics center as it means AMRs can easily adapt and scale to new layouts and facilities. Given the ever-evolving nature of packaging in e-commerce, AMRs offer a business the ability to change and grow as its situation demands, without the expense and disruption that adding extra fixed

infrastructure can bring. The creation of industrial grade robotic function packages incorporating advances in enabling technologies, such as vision, AI and machine learning (ML) presents new possibilities for the high speed processing of randomly presented products, with the ability to perform tasks such as autonomous gripping, singulation and sortation.

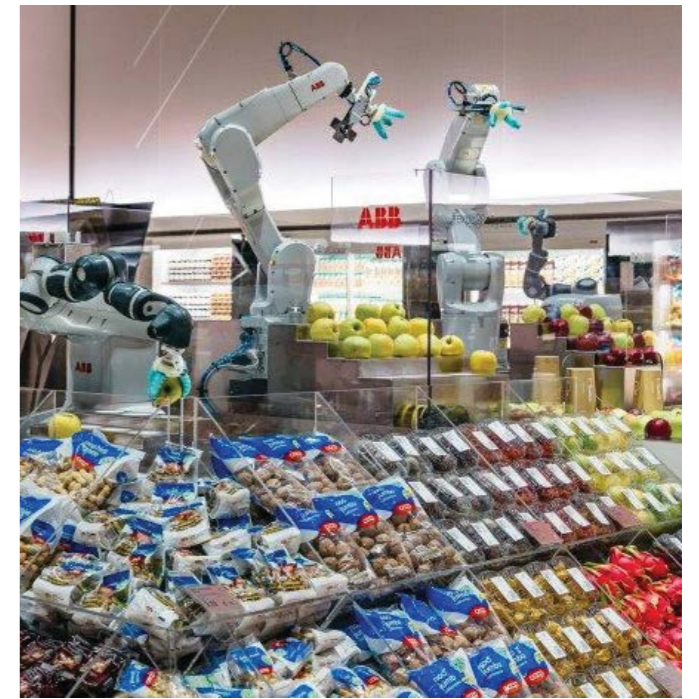
Together, these developments will help to address the rising trend towards smaller, more local warehouses located closer to the point of delivery, which need to operate quickly and flexibly.

While flexible automation is not predicted to replace the human workforce in the distribution network, robots will increasingly be deployed to streamline fulfilment processes by enabling improved utilization of labor through taking over tasks that are physically demanding and non-value adding and carrying them out faster and more efficiently. A supply chain survey conducted by the International Data Corporation (IDC)¹⁰ revealed that 72.8 per cent of respondents stated that robotics will be important or very important to their organization within three years.

3. Riding the e-commerce wave

Based on the experiences of recent months, the growing consensus is that those retailers best able to manage the demand surges will be the ones that are best positioned for the future.

With growth projections pointing to a 25 per cent rise in online grocery shopping within two years¹¹, retailers must start to undertake the necessary measures and investments to ensure they have the capacity to cope. Another challenge for grocers reliant on store fulfilment is to better synchronize online ordering with instore inventory



management systems, enabling to give shoppers best visibility of which products are available and which are out of stock.

Experts predict that the next 12 to 24 months will start to see a rise in supermarkets being transformed into hybrid facilities that separate online and in-store shopping operations¹². With the speed of deployment likely to accelerate as the available technologies and adoption by retailers both mature, the next two years should produce a major shift towards retailers moving some portion of their store infrastructure into this type of dedicated fulfilment approach.

In light of the impact of the COVID-19 pandemic, how do you think robotics and automation could help businesses?

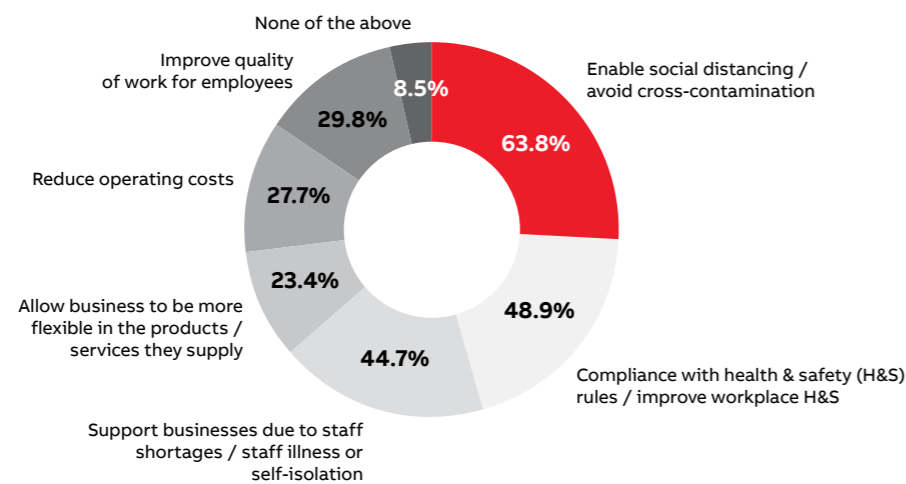


Fig 1: Results of 2020 survey of transportation and logistics companies carried out by ABB, with respondents from the UK, Italy, China, Sweden, Switzerland and Germany, highlighting opinions on the benefits of robotics and automation in tackling the impact of the COVID-19 pandemic on staff availability, safety and working practices.



Summary of key points:

- Automating tasks helps to minimize impact of sickness and quarantine on worker availability, meet social distancing requirements and improve efficiency, speed, and productivity.
- Logistics operations will increasingly need to automate to address the growing trend towards omni-channel distribution, working alongside human operators to help streamline efficiency and take over arduous and strenuous tasks.
- The continued growth of online shopping will put retailers and distributors under growing pressure to automate their operations to enable fast turnaround of customer orders across a range of product types.

Blueprint for automation

Before taking the first steps to robotic automation, it is crucial that businesses understand how a robot or robots will be applied in their operation and how they can be used alongside existing processes to deliver the best possible value and performance. This section sets out a summary template highlighting the key business and technology criteria for optimizing the adoption of automation within your business that will help to navigate you through the immediate impact of COVID-19 and beyond into the new norm.

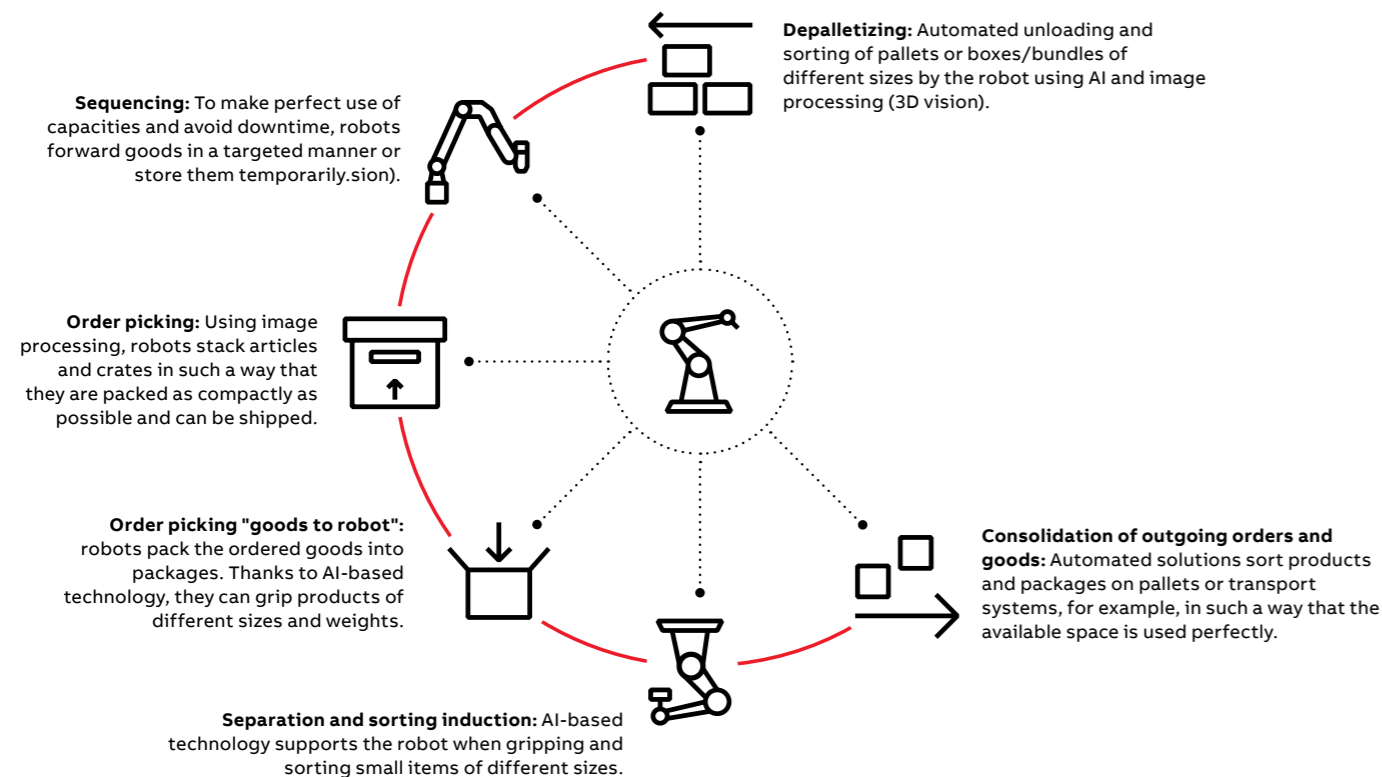
Taking the steps towards robotic automation

The journey towards robotic automation is a multi-stage process requiring consideration of a range of factors. It effectively begins with understanding what you already have and comparing it to where you want to be, considering your aims and what needs to be done to achieve them.

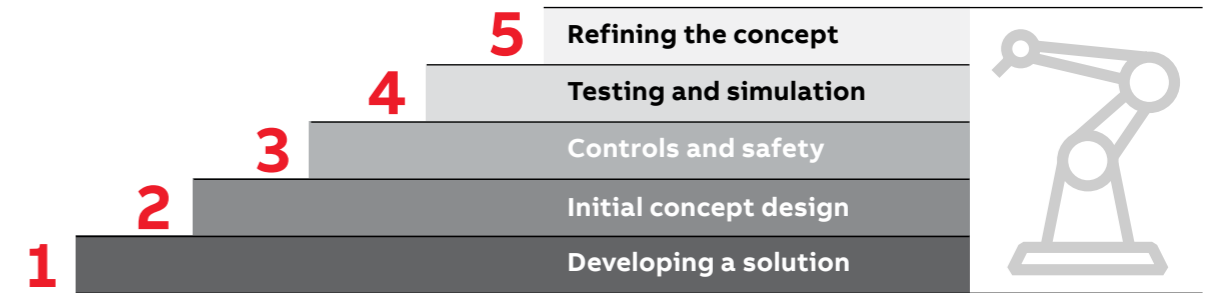


Key tasks that can be performed by robots

Logistics operations present scope for the automation of a variety of tasks that could help both to remove the burden on human operators and introduce added efficiencies that could speed up order handling and processing, including:



5 steps to successful robotic automation



In matching an automation solution to the demands of an application, it can be useful to adopt an iterative process to help guide the specification, design and implementation stages. The diagram below outlines the recommended steps for gauging the potential for robotic automation and selecting the appropriate solution for an application.

Step 1 – Develop your solution

A successful robot installation starts with a proper specification. Knowing exactly what you need, and communicating it to a supplier, will help to avoid problems later down the line caused by miscommunication or a mismatch in the capability of your system versus your requirements.

Factors to consider at this point include the types of products you need the robot to handle, how long you want it to operate for and any special conditions relating to the application itself, such as whether the robot will be operating in a sterile environment for example.

It can also be helpful to speak to anyone involved with the process that you are seeking to automate. Doing this can often reveal nuances in the production process that you might not be aware of that could have a material impact on the specification and eventual efficiency of a robotic system.

Once equipped with all this information, a target cycle time can then start to be calculated, which can then be used to assist in the overall design of the system.

If this is your first experience of robotic automation, help is available from both ABB and its system integrator partners through the ABB Value Provider network to help you develop a robot solution that meets your needs.

Step 2 – Create your initial concept design

Very often the information you need for this stage will already exist, either in your own organisation or in the wider market. In such cases, it is relatively easy to get an idea of what is being asked for and to start to devise a solution by developing an outline concept based on the desired installation. This can then be tailored to meet the requirements of the application being addressed.

Where additional equipment may be needed, or where a different or bespoke solution may be required, it is also worth consulting with experts and / or suppliers who can advise on the best way to tackle a particular problem. These organisations represent a fount of knowledge and can often use their experience to recommend the best way to tackle a given problem.

Again, you should look to enlist the help of a manufacturer such as ABB and/or a systems integrator to provide expert advice and input on shaping the concept.

Step 3 - Consider safety and control

Recent developments in robot control technology have enabled greater collaboration between robots and manual workers. The latest proximity detection software technology, for example, enables operators and robots to work safely in the same area by replacing mechanical safeguarding equipment with electronic motion detection and prevention measures, which can be reconfigured if required. In the event of an unanticipated obstacle being detected, the robot is automatically brought to an instant stop. By reducing the requirement for conventional guarding equipment, this technology helps to cut both the cost of an installation and the overall footprint, making them particularly ideal for locations where space is at a premium.

Another point to consider is the type of control equipment that will be used to control the robot. Many manufacturers, ABB included, offer application software packages that can help to greatly simplify the process of installing and setting up a robot. Features such as drag-and-drop equipment selection and offline simulation and testing, for example, help to remove much of the complexity and risk at the set-up stage.

Developments in HMI and integration technology are also presenting new methods for robot control. Many robot controllers feature their own easy-to-use HMIs, either built into the controller itself or using hand-held teach pendants, which allow operators to easily program and configure a robot without the need for specialist programming skills.

Step 4 - Testing and simulation

A lingering concern when it comes to robotic automation has always been the ability to prove that it can deliver real benefits, both in terms of performance and return on investment. Offline simulation tools, such as ABB's RobotStudio® software, enable entire installations to be created, tested, and refined in a virtual environment before they are put into action. This software can be used to model anything from an individual robot or complete robot cell through to an entire installation, showing the potential impact of a robot with other processes and enabling the development of solutions that will fit comfortably within the space available.

Step 5 - Refine the concept

Conducting the steps detailed above should start to give some idea of the efficiency of the robot installation, including whether it will be achieved or whether anything further needs to be done to achieve it. Using the information gathered, it should be possible to begin to calculate some potential cost savings, which in turn can be used to derive a likely return on investment figure.

In many cases, the process so far outlined will invariably reveal scope for changes or improvements that can be used to help further refine an initial concept.

A key factor to bear in mind is the need to cope with any future changes. Wherever possible, it is advisable to plan in any likely changes from the outset in order to maximize the effectiveness of your installation and ensure that your robot will be fully utilized. This will help to provide the flexibility both to accommodate future changes and to add extra tasks if required. In the context of pharmaceuticals production, such changes may be related to factors such as changes in packaging; developments in manufacturing best practice, for example using vision systems for serial traceability; or using a production line to handle multiple products.

**Summary of key points:**

- Robotic automation is a multi-stage process requiring consideration of a range of factors.
- Compare what you already have with where you want to be and what needs to be done to achieve any changes.
- Five key steps for making a switch to robotic automation:
 - Develop your solution
 - Create your initial concept design
 - Consider safety and control
 - Test and simulate
 - Refine the concept

How are ABB's robots being used in distribution and logistics applications?

The benefits that robotic automation can bring in distribution and logistics applications are seeing a growing number of companies looking to robots to help them meet the challenges associated with rising customer demands for

faster delivery, expanded choice and convenient collection. This section features just some of the examples of how ABB's robots are being used by our customers to enable enhanced levels of speed, efficiency and performance.

Dutch food company Heemskerk relies on ABB robots to deliver fresh, healthy food quickly and sustainably

Order picking has been automated with ABB robots at Heemskerk's processing facility, reducing the amount of time that fresh food spends in the supply chain, which has extended shelf life and minimized waste.

The challenge

The fresh foods company needed a flexible and scalable automation solution that would pick and stack orders, allowing Heemskerk to deliver the freshest food, just in time to supermarkets and other food service companies.

The application

Order picking crates of fresh fruit, vegetables and ready-to-eat foods according to orders from supermarkets and food service companies.

The solution

A robotic order picking installation at Heemskerk's Rjnsburg facility in the Netherlands prepares orders according to each supermarket or food retailer's needs, so that the products can be cross docked directly onto supermarket shelves instead of being stored at distribution centers.


[FIND OUT MORE](#)

Online pharmacy Apotea achieves 30 per cent higher productivity, helped by ABB robots

Three ABB robots installed at the logistics center of Sweden's largest online pharmacy are creating more efficient sorting and packing work flow.

The challenge

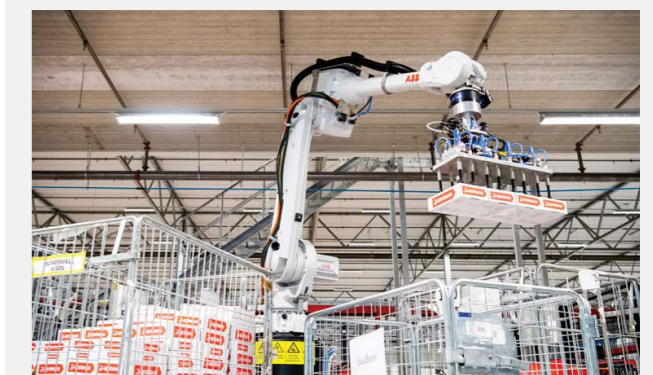
As an online retailer with no physical stores, Apotea wanted to find a way to speed up delivery of a greater range of pharmaceutical products to its customers. Delivering tens of thousands of packages every week, the company wanted to find a system that would be able to keep up with demand and ensure that products were quickly and correctly despatched to the correct customers.

The application

Sorting of orders and ensuring that each product is in the correct location ready for despatch.

The solution

Comprising of three ABB IRB 4600 general purpose robots, the robotic order sorting system sorts and packages products directly into designated cages ready for distribution to customers. By taking over the lifting of packages, the robots have achieved a 30 percent improvement in productivity and have helped to enhance job satisfaction by releasing workers to carry out other tasks.


[FIND OUT MORE](#)

Robots revolutionize drug dispensing at Shanghai Seventh People's Hospital

By automating a busy pharmacy department, the hospital has been able to develop a cost-effective method to deliver life-saving drugs, increase drug safety and create a more rewarding environment for its human workers.

The challenge

The hospital needed a solution to simplify work at the pharmacy while also enhancing the safety of the drug dispensing process at its inpatient department

The application

An RML and bin picking intralogistics operation to pick and place medicines. Complementary capabilities include 3D vision system and machine learning to help the robot improve its performance over time.

The solution

A robot pharmacy automation system featuring a Robot Mini Load (RML) synchronized with a 3D bin picking automation system to store, retrieve, pick up and sort medicines according to prescriptions. Unlike humans, who have the potential to make errors, the automatic system is more accurate, thereby creating a better and safer drug dispensing method.



[FIND OUT MORE](#)

ABB confectionery palletizing solution enhances collaboration and improves productivity by 53 percent

Compact pallet loading cell uses industrial robot with SafeMove safety solution to work safely and efficiently alongside human workers.

The challenge

Accurate loading of boxed confectionery products onto pallets

The application

A Nestlé factory needed a compact robotic cell that would accurately load products onto a pallet, reducing the need for rework while also allowing staff to work safely around the robot.

The solution

An ABB industrial robot equipped with a suction gripper and SafeMove robot safety technology ensured pallets could be loaded accurately and quickly, while allowing safe access to the cell for staff. As well as cutting the cost and time to implement the solution, the customer improved productivity by 53 percent.



[FIND OUT MORE](#)

Report summary

Delivering change

While the COVID-19 pandemic has had a severe impact on the retail landscape, it has provided the opportunity for companies to rethink their operations to look for new and efficient ways to deliver products. Most importantly, while the advent of vaccinations and improved methods of treatment might mean that the virus is on the retreat, the changes that it has brought, in terms of companies needing to diversify their business models and use new ways to utilize technology to cope with change, are here to stay. For companies looking to thrive in the 'new normal', there is therefore now a justified incentive to make investments in new automated technologies that may previously have been either deferred or deemed unnecessary in the pre-COVID world.

With the shift in the way that customers expect to receive products, the way that these technologies are deployed also needs to be reconsidered. The accelerating growth of omni-channel outlets, for example, may see premises such as shops being converted into pick-up outlets which are either partly or wholly automated.

What is certain is that those companies that invest in the latest automated technologies, including robots, are most likely to be best positioned to deal with the ongoing repercussions of the outbreak, as well any future instances of similar or other situations that will make it difficult or impossible to conduct 'business as usual' using outdated methods and equipment.



More information

ABB and its systems integrator partners offer a comprehensive range of robot products and services for logistics applications offering the flexibility to meet both current and future requirements.

Examples of areas where ABB can provide solutions include:

- Depalletizing
- Sequencing
- Buffering
- Retail order picking
- Goods-to-robot picking
- Singulation and sorter induction
- Outbound order consolidation
- Collaborative depalletizing

To find out more, contact your local ABB representative or click on the button below

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