white paper

# The Journey to Lights Out

## Now Is the Time to Consider Robotic Solutions

We Optimise Your Supply Chain | DEMATIC

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## Executive Summary

Robotics are widely used to store, retrieve and transport cartons and pallets. More allusive has been full automation of the most complicated and labour-intensive task in your warehouse—piece picking.

Given new advances in mechatronics and increasingly smarter software, the time has come for serious consideration to fully automate that last touch for a totally lights out facility. You'll increase efficiency and accuracy today, and you'll be well-positioned for the robotic advancements of tomorrow to stay ahead of the curve.

### Robotics Ideas of the Future

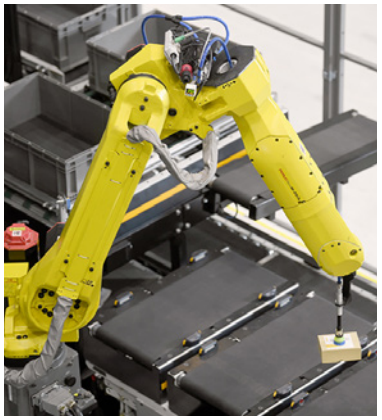
- AMRs
- Perception Robots
- Collaborative Robots
- Swarm Robotics
- Artificial Intelligence
- Machine Learning
- Deep Reinforced Learning
- Picking Robotics

Recent advancements in robotic technology like Cuboid swarm technology, robotic AMR's, new gripper technology with the dexterity of a human hand and Artificial Intelligence are creating new opportunities to drive efficiency and save labour costs.

As no single solution is ideal for every application, it is important to consider how you can integrate advanced components with sophisticated software into a seamless ecosystem that is flexible, scalable and modular.

Robotic piece picking technology has arrived, but are you ready to accept it? Ask yourself: Can your e-commerce business keep up with consumer expectations? Can you find and afford hardworking, accurate, reliable labour? Do you know the latest robotic capabilities are more affordable than ever?

If you answered yes to any of the above, this could be the right time to complete the automation of your warehouse.



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## Tightening Market Forces

Three factors have come together to support new robotic solutions in the warehouse today – and their impact will continue to grow.

| Factors | Drivers |
|---|---|
| E-Commerce growth | • Increased demand for faster delivery<br>• SKU proliferation<br>• Labour-intensive shipping to individuals<br>• Migration towards online friendly packaging |
| Rising consumer expectations | • Consumers expect more products and services in less time.<br>• B2B purchasers also expect more support and faster deliveries in an increasingly complicated business environment. |
| Labour availability and accuracy | • The labour pool is shrinking.<br>• Employee turnover is high, limiting long term productivity.<br>• Labour-intensive piece picking oftentimes results in errors.<br>• Repetitive work, wasted motion, uncomfortable work environments reduce worker efficiency. |

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## Advancements in Robotic Technology and Affordability

### *Modern Warehouse Robots: Flexible, Scalable, Modular*

Robots in the warehouse need to be far more flexible than in a manufacturing environment. Hundreds of thousands of different SKUs have different weights, shapes and sizes. Peak and off-peak seasons require scalable solutions.

**Robotic Challenges in Logistics**

- Unstructured environment
- Large range of SKUs at a fast rate
- Unpredictable product throughput
- Peak and off-peak seasonality

The wide range of items robots can now successfully pick finally creates the ideal goods-to-robot solution for a number of industries, including e-commerce, apparel, grocery, pharmaceutical, consumer electronics and general merchandise.

The goods-to-robot picking solution combines an articulated robot arm with sensors, vision and gripping software, and end effectors to pick sequenced eaches and place them directly into order totes.

- An **articulated robot arm** is the foundation of the goods-to-robot picking solution. Housed in a stationary work cell, it enables the end effectors to perform mechanical tasks efficiently and accurately
- **Perception technologies**, such as sensors and cameras, enable the robot arms to ‘see’ what they are picking. They view the shape, size and texture of products to be picked and track their motion in real-time. Machine vision software interprets this data, finds the product, and plans a path for the robot to follow, while simultaneously calculating the orientation for the gripper to pick up the product.
- **Gripping and end-of-arm tooling (EOAT)** are advanced end effectors that pick up and move items using a combination of vacuum suction, pneumatic pressure, servo actuation, adhesive pads, and tactile sensing and gripping. The challenge is to match an end effector to the family of parts being picked. The EOAT options you select may be required to handle anything from a delicate mushroom to a big box.

The technology for effective robotic piece picking is here now and continues to evolve at a rapid pace. Beyond reviewing the technical aspects of the various components, you also need to consider the flexibility, scalability and modularity of a completely integrated system.

It’s important to take a holistic approach to find the right combination of mechanical solutions from multiple sources so you can configure the correct solution for your facility.

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### *Robots of Tomorrow: Working for Us and with Us*

While today's technologies offer a combination of mechatronics and software, tomorrow's robots will also include advanced Artificial Intelligence (AI), computational power, collaborative and mobile capabilities.

- **AI machine learning** software analyses each SKU, adding to the database as it learns. It identifies the difference between product type and teaches the robot how to handle selected pieces. Machine-learning software continues to evolve and will increase the volume of picks over time.
- Cloud computing has increased the robot's **computational power** to process data generated by the picking module. In the future, the cloud may enable shared AI machine learning between individual robots.
- **Collaborative robots (cobots)** work alongside humans in applications where machine learning cannot recognise certain SKUs. The operation of cobots has become as easy as using a smart phone and the price continues to drop.
- The next step will be to mobilise the robotic picking module to create a **robot-to-goods solution.** With another touch being handled by automation you'll be that much closer to a lights-out environment

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## The Journey to a Lights-out Warehouse: Where to Start

**Your New Team**

- Robotic Arm
- Gripper
- Vision software and hardware
- Artificial Intelligence
- Computational Power

Robotics are quickly making inroads in the logistics industry, but are you prepared to take the next step? Successful implementation depends on these considerations:

- **Workforce readiness:** Do your workers have the skills to manage automation and more importantly, do they embrace the introduction of automation that can augment their performance?
- **Return on investment:** What impact do you expect on your bottom line by adding advanced robotic systems? What do you need to achieve now and in the future?
- **Finding the right solution for your operation:** Does the robotic system you're considering have the flexibility and scalability to change with your operation? Can your system keep pace with market forces that impact your business? The total solution must be implemented as an ecosystem by a supplier with deep robotics knowledge. Additionally, it needs to be architected using open standards so that components can be easily upgraded as technology advances. It's not just a robot-- you are assembling a system
- **Realistic expectations:** The transition to lights out operation requires a manageable phased implementation. It's important to work with a system provider who understands the technology and your timeline for integrating it into your total operation.
- **Finding the right provider:** You need to consider the upstream and downstream effect of every new component in your total system. This requires finding a system integrator that takes a holistic approach, based on the best available mechatronic technology, intelligent software and decades of logistics management expertise. You also need to ask if they offer experience and understanding of robotic systems and technologies, applicable industry standards such as RIA/OSHA/NEC/UL and capability for implementation at a large scale as well as extensive service and support capabilities.

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## At a Crossroads: Can You Afford to Wait?

The old formula for product selection was "…pick two out of these three: Good, Fast or Cheap." Today market forces are driving warehouses to demand all three. Fortunately, new robotic solutions are making that possible. The industry is in the early-adopter stage of harnessing all the capabilities that make warehouse operations more accurate, faster and more affordable.

Right now, there is no magic bullet that can ***instantly*** transform a warehouse into a lights out facility. However, technology currently available can help implement an effective goods-to-robot picking solution today and position the warehouse for future advancements. Those who take a wait-and-see approach may lose their competitive advantage as time and technology march along.


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## About Dematic

Dematic is a leading supplier of integrated automated technology, software and services to optimize the supply chain. Dematic employs over 6,000 skilled logistics professionals to serve its customers globally, with engineering centers and manufacturing facilities located around the world. Dematic is one brand under the KION Group of companies and has implemented more than 6,000 integrated systems for a customer base that includes small, medium and large companies doing business in a variety of market sectors.

Headquartered in Grand Rapids, Michigan, Dematic is a member of KION Group, a global leader in industrial trucks, related services and supply chain solutions. Across more than 100 countries worldwide, the KION Group designs, builds and supports logistics solutions that optimize material and information flow within factories, warehouses and distribution centers. The company is the largest manufacturer of industrial trucks in Europe, the second-largest producer of forklifts globally and a leading provider of warehouse automation.

**If you are interested in learning more about this topic and how we can help, please contact Dematic at 01295 274 600 or visit: dematic.com.**

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