DO RETAILERS NEED WAREHOUSE AUTOMATION?

javelin group

Digital Retail by Accenture Strategy

RETAILERS ARE INCREASINGLY LOOKING TO WAREHOUSE AUTOMATION TO MEET CUSTOMER DEMANDS, BUT IS IT RIGHT FOR ALL?

Warehouse automation solutions are increasingly being assessed – and implemented – by retailers (both food and non-food) seeking to handle the growing scale and complexity of their ecommerce logistics operations and to meet the ever-increasing demands of their customers more quickly, accurately and cost effectively.

But automation is not right for all retailers – many factors need to be carefully considered, and the path to automation success is not simple. Assessing the suitability of automation for a logistics operation and the type of automation to use are the starting points, while understanding how to implement the solution is the key to success.

ARE YOU READY FOR WAREHOUSE AUTOMATION?

Given the considerable capital investment required for automation (not to mention the huge cultural change, risks of transition, and potential limitations to future business flexibility for less mature, fast changing businesses), retailers must be clear on the justification before embarking on an implementation.

To ensure a business case for automation is not built on a sub-optimal base, retailers need to ensure all manual fulfilment processes and warehouse layout/flow are optimised before considering automation.

Scale is also critical to any decision and, as a rough guide, automation is typically considered by businesses of £250m+ revenue.

When automation is considered, a stepping stone rather than big bang approach is generally advisable. Whilst future space and layout requirements should be assessed within any warehouse design to ensure flexibility to accommodate potential automation, understanding which elements of an operation should be automated and when is key.

Ultimately, any decision to automate requires a pragmatic approach to:

- Drive efficiency in areas of greatest scale and degree of standardisation
- Ensure future business flexibility is not constrained
- Implement in areas with a demonstrable return on investment

It is worth noting that the deployment of automation is not a guarantee of industry-leading cost performance – Javelin Group's recent benchmarking work identified several large manual retailer operations that are achieving a lower fulfilment cost per unit than comparable businesses with far more automated sites.

Within non-food, M&S' site at Castle Donington is among the largest and most highly automated of its kind with fulfilment of up to 2 million items per week facilitated by 11 miles of conveyors, automated storage and retrieval systems, GTP picking and four dynamic buffers holding up to 800k hanging garments.

WHAT ARE THE BENEFITS OF WAREHOUSE AUTOMATION?

As the scale and complexity of an ecommerce logistics operation increases, so too does the appeal of automation, which has a number of key benefits.

REDUCED HEADCOUNT

Central to any automation business case is the headcount savings, driven by labour productivity improvements. These are dependent on the technology deployed, and can be significant even after accounting for the addition of new, highly skilled roles required for physical and system maintenance. For example, with goods-to-person (GTP) order-picking automation, picker walk time – typically 20-40% of a manual operation's total direct labour hours – can be all but eliminated.

However, with the ROI for automation technologies often in excess of four years, labour cost reduction alone may not offer a sufficiently compelling reason to justify investment.

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At scale, the resource requirements of a manual site can be challenging from aisle congestion impacting productivity and throughput, as well as an over-reliance on labour availability in the area. These issues are pronounced in businesses with significant peak periods where the number of people required can be extremely challenging to operational efficiency, as well as costly to recruit and train for short periods. This creates a dilemma for retailers – move to a multi-site operation or automate?

Single site operations, offering stock efficiency advantages and avoiding substantial costs from additional rent and management, can significantly increase the appeal of automation. Fewer staff not only reduces cost and congestion, but the exposure to labour market uncertainties and increasing wages. An increasingly well-educated young workforce less inclined to take low-skilled warehouse jobs, coupled with the potential impact of Brexit, further exacerbate these concerns.

IMPROVED SPACE UTILISATION

Automated storage solutions provide increased stock density compared to even the most space-efficient manual ones. By using the full height of the warehouse and greatly reducing or eliminating aisle space, the required footprint can be significantly reduced (30-50% is commonly achieved) meaning lower rent costs or extending the life of an existing building.

For retailers locating their fulfilment operations close to dense urban areas, the challenge is finding large warehouses within close proximity to major cities. The higher land and labour costs of these locations often increases the attractiveness of automation to optimise space-efficiency, and maximise productivity and throughput capacity.

INCREASED CAPACITY AND THROUGHPUT

Automation technologies are built to handle scale and can significantly increase both storage and throughput capacity compared to a manual operation. Deployed well, the right automation decisions enable businesses to meet more demanding timelines more accurately and cost effectively. A lower reliance on a human workforce can also mean greater flexibility in responding to volume fluctuations.

IMPROVED ACCURACY

Improved accuracy throughout end-to-end processes reduces costly errors (e.g. by reducing the likelihood of item mispicks or despatching parcels on time and to the correct carrier) for the retailer and drives better service levels for the end customer. Stock shrinkage, damage and theft are also minimised by fewer touchpoints by staff.

Following its 2012 acquisition of KIVA (now Amazon Robotics), Amazon's steady rollout of its mobile shelf solution now has over 45,000 robots in operation across 20 sites globally – including several in the UK and more planned to open.

WHICH STAGES OF YOUR FULFILMENT PROCESS ARE RIGHT FOR AUTOMATION?

Storage, picking and despatch are the most commonly automated process areas and where the greatest cost savings and throughput capacity improvements are realised.

In addition, various technologies exist to automate end-to-end processes (with many equally applicable across both food and non-food). Assessing potential suitability and degree of automation will differ by retailer based on factors such as business model, proposition, scale, product type, product and process standardisation, range size, inventory levels and order profile.

Here are some of the most common applications of automation, within the key process areas of a logistics operation.

RECEIVING

Automated solutions for goods-in processes are heavily dependent on the degree of control a retailer has over its inbound supply chain and the typical inbound order size.

That said, with inbound typically accounting for less than 10% of direct labour hours within a manual operation, the 'size of the prize' for automation is relatively small. Except for some simple mechanisation solutions (e.g. telescopic boom conveyors to aid unloading of loose loaded containers, cubiscanners), most retailers' goods-in processes have remained predominantly manual.

More heavily automated technologies do exist (e.g. automated vehicle unloading/loading capable of unloading a 40-foot trailer in less than ten minutes) but these are costly and generally more suited to manufacturing than retail ecommerce.

Whilst largely manual, inbound processes are key to implementing automated storage and retrieval systems (AS/RS), which require products to be stored in standard carton sizes or totes.

This can be particularly challenging for traditional store-based retailers whose products typically do not come 'ecommerce ready' and therefore require significant decanting of single items from bulk supplier packaging into standard totes for putaway.

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STORAGE AND RETRIEVAL

The choice of storage solution typically lies at the heart of an automated solution, and the universal objectives are denser, more space-efficient storage, increased throughput capacity and reduced FTE requirements.

There are many vendors offering a host of AS/RS solutions for both bulk pallet storage and smaller cartons or totes (e.g. mini-load cranes, multi-shuttles, carousels, "hive" robots, mobile shelf solutions). Whilst additional labour hours are required for decanting on inbound, these can be offset by the potential labour savings within putaway, replenishment and – if deploying fixed GTP pick stations – picking.

When assessing which automated storage solution – or mix of solutions – is appropriate, retailers need to consider a number of key elements including which type of products they handle (e.g. small products, large products, hanging garments, temperature controlled), range size, split of bulk versus pick storage and location types, and putaway/retrieval speeds needed to achieve desired throughput capacity.

Multi-shuttle solutions are generally favoured over mini-load systems where throughput speed is important. Whilst multi-shuttles can be 3-4 times more expensive to implement, they are capable of up to 5-10 times the speed of mini-load with significantly better energy efficiency.

Despite "hive" technologies offering the most dense storage solution (as no aisles are required), outside of Ocado, adoption within retail ecommerce operations has been limited.

In most cases, AS/RS solutions offer a high degree of modularity and scalability to grow with a retailer's needs (footprint permitting) and the ability to handle range growth with limited impact on pick productivity (assuming capacity to hold totes).

A retailer at the forefront of automation and robotics within online grocery is Ocado. Its highly automated sites continue to evolve with its latest generation warehouses deployed with an AS/RS of autonomous robots that move on top of a storage grid or "hive" and access stacked crates as required from within the structure.

PICKING

Picking is generally the most costly part of an operation and lends itself to automation, particularly if combined with automated storage. The important choice is whether to use GTP or zone picking regimes. GTP picking is reliant on an AS/RS or equivalent solution bringing product to fixed pick stations while, for zone routing, static pick locations are typically replenished manually.

GTP is generally more efficient (depending on the operation and solution deployed) and can achieve picking speeds of 500+ items/hour versus c.350 items/hour for zone routing, but is also more costly.

For zone routing, conveyor-based technologies transfer containers assigned to a customer order only to those areas of the warehouse where a product needs to be picked for that order. These are far more common within online grocery, which requires picking large numbers of items per order across a broad SKU range.

System vendors point to the greater scalability of GTP versus zone routing, with the latter generally not recommended beyond c.60-70k orders/week due to potential conveyor flow congestion, greater footprint requirements and the increasing complexity of balancing picker workload across large numbers of zones. Often a hybrid approach is taken and it is common for grocers to use a mix of multi-shuttle GTP (long tail of very slow movers), zone routing (for relatively fast movers) and manual pick (e.g. for frozen or odd size).

Within non-food operations, the decision is influenced by the picking method. Batch and zone picking with sortation enables efficient picking of multi-line orders and requires significantly reduced capital expenditure versus AS/RS-enabled GTP solutions. A range of high speed sortation systems (e.g. cross belt sorters, bomb bay sorters, tilt tray sorters) can be utilised to sort complete orders to pack stations. Solutions exist for both flat and hanging product sortation.

Pouch sorters offer a slightly different hybrid option. They are typically deployed as storage for fast movers as well as for putaway of returned items. The system can then be instructed to pick required items in a desired sequence and transport completed orders to the packer.

PACKING

Direct-to-consumer order packing is another area that is a costly and time consuming part of a non-food operation and often requires a high degree of co-ordination, especially if multiple handling types are required (e.g. flat, hanging, secure, hazardous). Suppliers offer a range of solutions in this area and help prevent packing from becoming a bottleneck in the rush to hit increasingly shorter delivery lead times.

High throughput storage solutions, such as shuttles, carousels or sortation systems, are often used to manage order consolidation to ensure different elements can be brought together at the packing station at the right time. A number of automated solutions exist to optimise the packing process itself by helping reduce labour costs, packaging material costs (e.g. by selection of right size box, optimal use of tape and and fill materials) and shipping costs (e.g. by avoiding potentially higher shipping costs due to unnecessarily large package dimensions).

Within food, whilst manual store picking remains the dominant model for the traditional UK grocers, ecommerce demand and store capacity issues in major cities have necessitated the introduction of "dark stores".

Tesco's dark store rollout has been increasingly more automated with its latest generation site in Erith comprising significant automation within putaway and storage, picking (conveyor-based zone routing and GTP) and despatch (dual purpose multi-shuttle solution).

These include automatic bagging machines, cartonisation (i.e. making bespoke carton sizes from a sheet of cardboard), carton selection, erection, fill and sealing, label application and check weighing.

Suitability will depend on the presentation requirements and value added services (e.g. carton inserts, gifts with purchase, gift wrapping). The more premium the packaging requirements, the less appropriate packing automation becomes.

SORTATION AND DESPATCH

Despatch solutions are heavily dependent on the required presentation and choice of shipping method. Direct-to-customer distribution of non-food is typically via a carrier network, and the degree of carrier sortation needs to be considered. Most direct-to-consumer retailers of scale deploy despatch sortation automation, particularly when sorting parcels for multiple carriers and carrier services (e.g. 24h, 48h, international) or pre-sorting by carrier depot to obtain carrier discounts.

Despatch sortation solutions have been successfully used by retailers and parcel couriers for 30+ years and, compared to other automation technologies, require relatively simple and quick system integration. Cost is dependent on technology, throughput speed and number of chutes required.

Within online grocery, despatch is often a retailer's first foray into automation and AS/RS shuttle solutions are most commonly used to store and sort completed totes ready for despatch. The consolidation/ marshalling space and labour efficiency savings are most significant as the number of pick zones increases (often the result of increasing SKU ranges).

The presentation of totes to drivers in optimum drop sequence facilitates faster van loading by eliminating time re-sorting totes on the loading dock. This in turn, enables grocers to turn loading docks more quickly and increase the time delivering customer orders.

RETURNS

Returns automation is less widely deployed. However, a number of solutions exist and are mostly targeted at online fashion retailers whose returns rates can often be as high as 25%. Where returns processing represents a significant proportion of labour hours, solutions typically considered include:

- Steam tunnels for re-conditioning
- Poly bagging machines to re-package items ready for resale
- Pouch sorter for automated putaway and picking

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HOW DO YOU ENSURE A SUCCESSFUL IMPLEMENTATION?

Automation implementations are significant, complex and costly transformation projects and there are a number of key considerations to avoid potential pitfalls and ensure success.

1 CLEARLY DEFINE THE PLANNING BASE AND OWN THE AUTOMATION DESIGN

The planning base, that is the future business volumes, range, stock, and service requirements, should be clearly defined, documented and agreed based on the business strategy and growth projections. These will form the basis of the solution design, so getting this step wrong can have costly consequences. Often the planning base is built with high/low scenarios, which are used to check the flexibility of the design.

During selection, the retailer should ensure vendor solutions can meet business requirements by carrying out detailed simulation modelling to assess expected performance and any key dependencies. Budget and implementation timelines must also be clearly outlined. Post selection, the retailer should closely manage the design and ensure internal teams are fully bought into the vendor's proposed solution and its ability to deliver the benefits.

2 DELIVER SMALL PROJECTS AND TEST REGULARLY — EVOLUTION RATHER THAN REVOLUTION

A stepping stone approach is generally recommended for automation. Where possible, risk should be managed via phased implementation rather than a big bang approach.

Ensure time is allocated to test the solution. Delivering smaller projects and testing regularly reduces the business risk and allows companies to identify mistakes and rectify problems quickly.

Consideration must also be given to the space required for implementation. Transition risk is significantly increased if implementing within an already space-constrained site. Deployment within a new site or existing site with sufficient space set aside is preferable to ensure minimal disruption.

3 GET THE SYSTEMS RIGHT

The solution design should not be over-complicated or limit future flexibility and the IT architecture should be clear and simple. All automation comes with its own warehouse control system (WCS), and the design and integration of the warehouse management system (WMS) and WCS are essential to get right.

For highly automated sites, it is generally best to use the vendor WCS to run all of the warehouse function, eliminating the need for a separate WMS. With part-automated sites, the integration of WMS and WCS and functional ownership are core to the success of the automation.

4 ENSURE STRONG PROGRAMME MANAGEMENT, COMMUNICATION AND GOVERNANCE

The programme director should maintain the scope, spend, timelines and communications strategy. Key stakeholders within the business need to understand why automation is needed and share the vision. A clear view of the investment case, non-financial business benefits, programme timelines and key risks should be communicated. Steering and governance committees are useful forums to consult important stakeholders and understand any concerns.

Some external stakeholders, such as suppliers, will need to be engaged in the warehouse automation and how it will affect them. This should not be underestimated.

5 MANAGE CULTURE CHANGE

Automation, in practice, should make an operation cheaper and faster. In reality, the business needs to accept a new way of working for the benefits to be realised. It is essential that the proposed solution can be operationalised quickly. All the elements of this need to be considered from the start, including all the transition planning, people and role changes, new hires, training documents and support.

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ABOUT JAVELIN GROUP

Javelin Group, part of Accenture Strategy, provides strategy consulting and digital transformation services to the world's leading retailers and consumer brands. Javelin Group helps clients improve their competitiveness by anticipating and responding to the rapid changes in customer shopping habits and retail technologies. In 2015, Javelin Group was acquired by Accenture to spearhead digital retail within Accenture Strategy.

The Javelin Group Operations practice is a dedicated team of retail specialists with many years of experience in the strategic transformation of retail supply chains and selling operations (across all channels), with deep experience in all of the key functional areas (retail and ecommerce buying, merchandising, supply chain, logistics, retail store operations and contact centre). The Operations practice has advised 100+ retailers, as well as many brands and B2Bs in all product categories on their strategic retail operational change.

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