

# Order picking ...some basics



The following chapters shall help to define terms, introduce relevant terminology and show in brief at which points it would make sense to implement streamlining measures.

Today, more and more customers follow the JIT-strategy and, while minimising their own stock quantities, have the right amount of goods of the required quality delivered at the right time to a given place. This tendency causes suppliers to deal with an increasing number of deliveries with small quantities per reference to be delivered within a very short time. As a consequence, the resulting pressure on costs and performance obliges manufacturers and distributors to critically analyse order processing in their warehouses.

Against this background, the **reference oriented order picking strategy** is frequently chosen. In medium-sized companies, the BITO compact sorter (as described on page 2.7) can further enhance the streamlining process.

## Definitons

Order picking means taking items from a range of products on stock and assorting them to a specific order.

This order can either be an external customer order with a direct influence on turnover or an internal production order.

## Order picking zones

The basic decision as to the organisation of order picking is whether to pick an order in **one** or **several** zones.

In the **single zone system**, the order picker's field of work extends over the entire picking area, whereas in the **multi zone system** each order picker is assigned a specific picking area.

## Order picking methods

Another basic decision concerns picking methods. In most companies, order picking is done according to the **one-by-one principle**, i.e. orders are picked individually and chronologically. Only if all items of an order have been picked will the next order be processed. In the case of **parallel order picking** the items of one and the same order will be picked by several order pickers each working in his picking area. Practice shows that this method is mostly applied in combination with two step order picking (see below), as this minimises the time required between the beginning of order picking and sortation/packaging.

## Order picking strategies

**Single step** or **order oriented picking** is the most widely spread strategy.

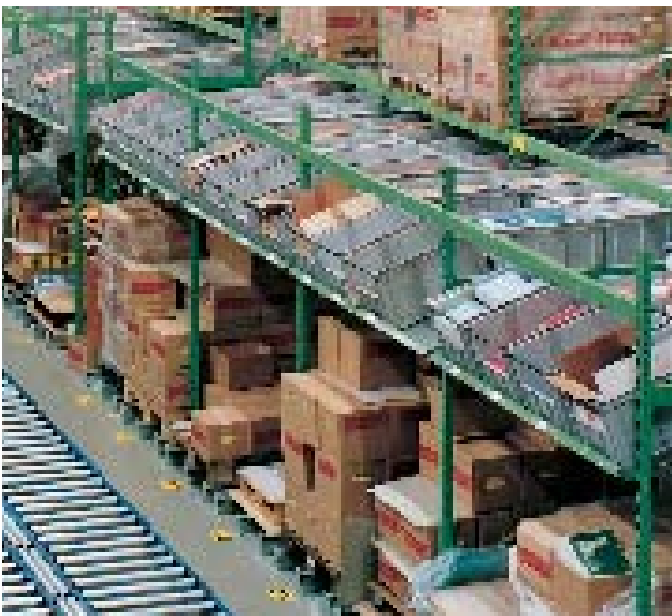
Orders are picked chronologically in one and the same work cycle. The order picker will take the required quantities per item figuring on his list and, upon completion, will give the picked order to the packaging/despatch area before starting to pick the next order.

In a variant to this strategy the order picker will process two or more orders at a time by picking the required number of items stored at the specific storage location into order related picking bins. This strategy reduces travel routes.

In a further variant which can be defined as **single step, multi zone picking** the order related picking bin travels from one picking area to the next and is subsequently filled by the responsible order picker before it arrives at the packaging/despatch point. Adequate means of transport will reduce travel times and better knowledge of the products stored in a particular area contribute to reduced picking mistakes. Characteristically, items picked according to the single step, multi zone strategy do not have to be resorted.

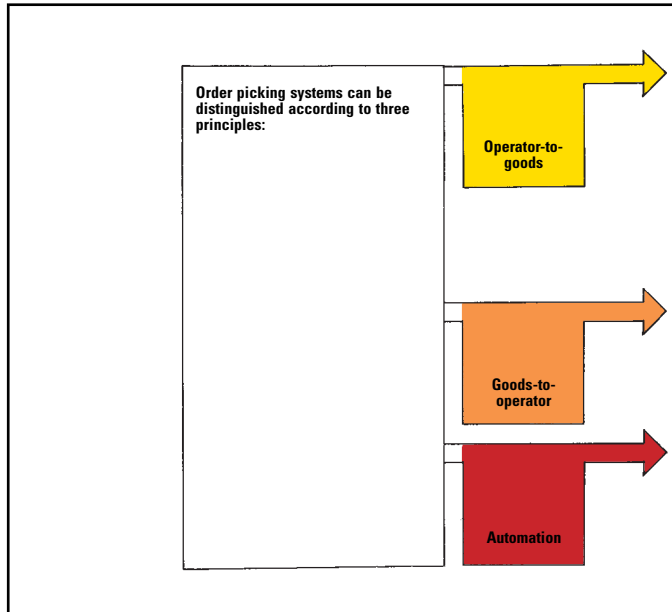
The strategy which is best for picking a large number of orders consisting of just a few items per reference from a huge range of products is the **two step** or **reference oriented strategy**.

In a first step, the order picker picks the goods according to a picking list which groups together the same reference items from many orders. In a second step, these items are regrouped according to the specific order which is then further processed. Sorting can be done manually or with the help of high performance sorter installations. **Sorting** can be done **manually** (see **BITO compact sorter**) or with the help of other high performance sorter installations. This strategy is most effective in combination with a **multi zone system**, i.e. if the warehouse is subdivided into picking zones.



# Order picking systems

## Schemes and criteria



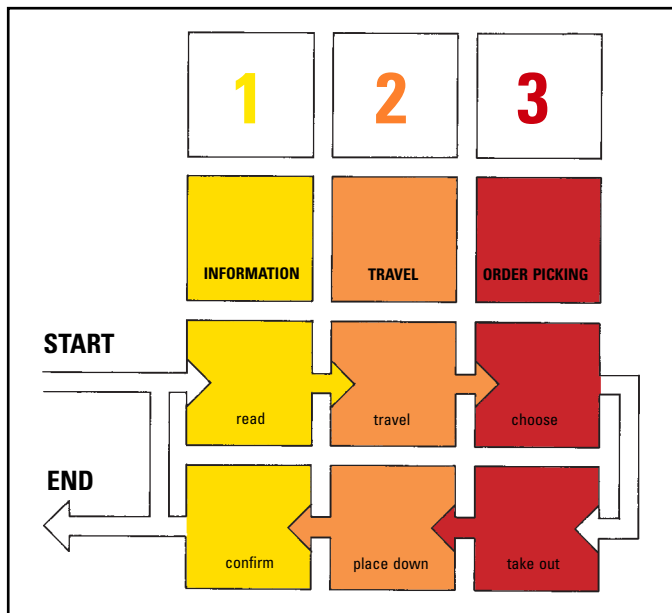
### Order picking techniques

The classic storage concept of **operator-to-goods**, also described as the **static order picking system**, consists of single or multilevel installations of boltless and bolted shelving, cantilever and pallet racking. These systems operate on a **single level**, i.e. the order picker either walks or drives his vehicle to the storage locations. His picking activity is restricted to one and the same floor.

For **high bay** racking and shelving the operator-to-goods principle is also applicable. However, these are serviced on **multi-levels** by order picking trucks and stacker cranes which take the order picker to any required position.

Horizontal or vertical carousels, automatic bin storage systems and pallet racking with automated replenishment and retrieval fall into the category of **dynamic order picking systems** which work according to the **goods-to-operator** principle. The main characteristic of these systems is that **the order picker works at a fixed work station**.

The third alternative - **automation** - further increases picking performance by incorporating automatic order pickers with magazine dispensers or order picking robots. However, certain restrictions limit their application.



### Improvement potential

The order picking activity consists of three parts - information, travel and order picking.

**Information** - which accounts for 10 to 20 % of the total picking time - has a great improvement potential. Logical, short and clear instructions as to storage positions and the information on the accompanying paper work help to improve output. Paperless order picking systems are particularly effective in achieving a higher picking performance.

The greatest improvement potential is in **travel**. With a share of 50 to 70 % of the total picking time, this part has the greatest influence on cost. An ABC analysis, which provides the basis for the proper allocation of storage positions and the right choice of storage techniques, helps to shorten travel routes considerably. This result can be even further improved by carefully planning picking routes and choosing the right means of transport. The order picking volume can also be increased by establishing decentralised delivery stations for completed orders.

**Order picking**, which accounts for 20 to 30 % of the total order picking time, only has a limited improvement potential. A correct ergonomic design of the storage installation, in particular of the picking point(s), helps to improve productivity. Further improvements can be achieved by a better presentation of the stored goods and by allocating storage positions in accordance with the product's turnover.

Shelving - single tier Shelving - multi-tier	35-80 40-90	Items picked per hour per order picker
Pallet racking - single tier Pallet racking - multi-tier	30-50 40-90	
Carton live storage	150-250	
Live storage combined with paperless order picking system	350-450	
Automated bin storage	40-250	
Carousels	100-150	
Robots	100-350	Items picked per hour
Automated order pickers with magazine dispensers	5000-10 000	

### Picking performance

So far, it has not been possible to provide universally applicable standards in order to define warehouse productivity. There are too many diverse factors which influence picking rates. Amongst these are the great variety of possible combinations of order picking systems, picking strategies and warehouse organisation. Moreover, the size and the weight of goods have to be taken into consideration, as have the range of items, the order volume, the number of items in each range, the kind of software employed, conditions of work etc.

# BITO Order picking installation... ...efficient solutions through combining the right systems



Functional and efficient operations are rarely single system stores as to organisation, picking strategy and shelving and racking technology. Seen from the economic point of view the "optimum" warehouse will always be a combination of several strategies and techniques.

As shelving and racking is a centre piece of a warehouse, the right "mixture" will considerably increase work efficiency in a picking store.

The selection and implementation of different shelving and racking systems as well as the amount of reference items ready to be picked are determined to a degree by reference turnover in a given period of time.

Too huge an amount of goods ready to be picked requires less replenishment operations, but leads to longer travel routes. This, in turn, inevitably results in longer order processing times and higher costs.

In general, the decision on the right warehouse equipment should therefore not be based on the number of replenishment operations, but on the turnover of a reference. On the other hand, an insufficient amount of goods ready to be picked would require too many replenishment operations within a given period of time which could lead to disruptions in order picking at the work stations, because there are not enough items on stock.

With more and more markets changing it is necessary to have a more flexible approach to warehousing with shorter order processing times and a real understanding of delivery requirements.

This new situation is characterised by an ever smaller order volume per reference ordered at shorter intervals, but with a higher turnover. At the same time, the number of different references ordered has increased and has to be supplied within shorter delivery times. This development favours the two step or reference oriented picking strategy. The **BITO compact sorter** (see opposite page) can further improve the efficiency of this strategy and, in small and medium-sized storage installations, it is a real alternative to automated sorter systems.

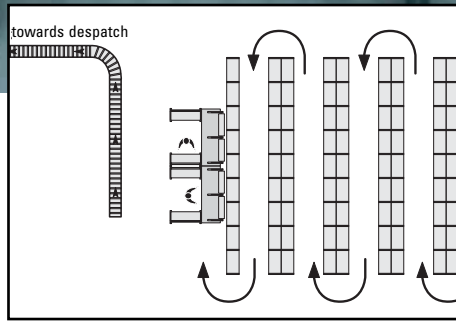
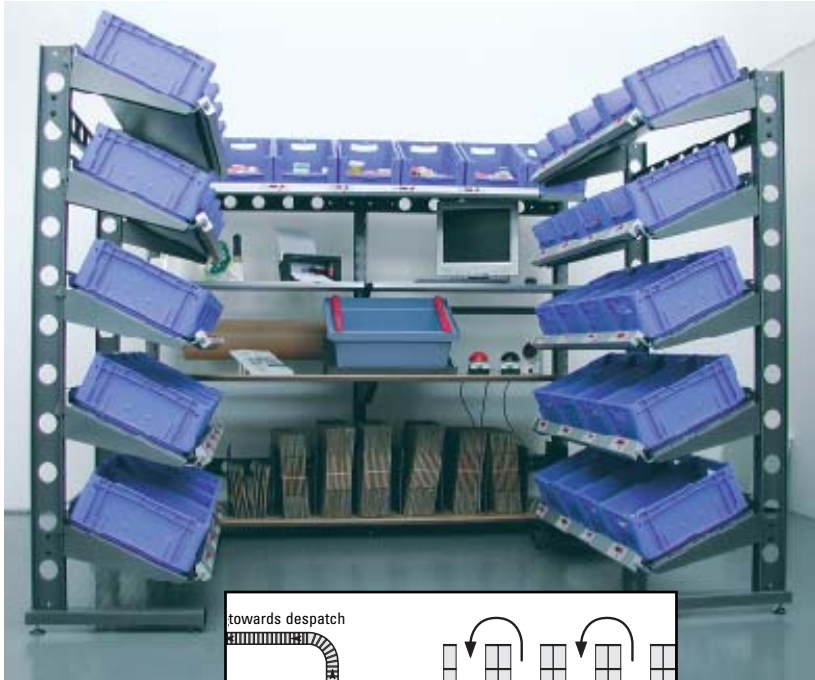
It is therefore absolutely essential to make an exact article analysis which takes all relevant factors into account such as the kind of picking unit, i.e. single items or full case picks, the number of orders to be processed and the number of references to be picked in a given time, the number of items picked per reference, item weight and volume, range of products, warehouse turnover (ABC analysis) as well as the particularities of a product, f. ex. whether it is a seasonal or a special offer product. Valuable help for product data capture is provided by the **KHT measuring equipment for storage units** (see opposite page).

Any picking warehouse is just as good as the assessment of product data and order structure which should have been made in the planning phase.

For this reason, the layout and the organisational structure of a warehouse has to meet the highest demands, as picking performance depends to a large extent on the right product presentation to the order picker and on the sufficient quantity of items in direct access. Therefore, warehouse planning is an important economic factor for a company.



# BITO Compact sorter and product data capture



## BITO Compact sorter ideal for reference oriented order picking

### Features:

Manual sorting station realised with BITO TEC racking. Equipped with a screen, a scanner, a label printer operating with the standard software SISA® Batchmaster and a display for each shelf compartment/storage position. The number of orders per batch is determined by the maximum number of order related bins/order specific storage positions per sorting station.

### Function:

The computer software registers customer orders from the warehouse management system and, in a first step, lists the number of items per reference from all customer orders of a batch.

After picking, all items are scanned and assigned to a specific storage position/customer via display indication (step two).

After collating the individual orders, the whole batch can now be prepared for despatch.

### Benefits:

**A changed order pattern with a growing number of orders with less and less items per order line to be delivered in ever shorter time limits, requires a shift from the order oriented to the reference oriented picking strategy. Automation would be a solution, but can often not be implemented, because it is expensive and requires a high degree of flexibility.**

**The low cost solution is provided by the BITO compact sorter, which reduces up to 90 % of travel times and almost eliminates picking errors.**

## Knowing your product data is the key to a smooth warehouse flow...

Only if the volume and the weight of storage units are known can the storage space as well as handling capacities of internal and external transport facilities be optimised.

**With the help of the KHT measuring equipment it is possible to register the length, width, height and weight of an item in some 3 seconds.**

A fine resolution infrared light grid registers the length, width and height of an item. The KHT measuring equipment can be completed by a weighing unit, a mobile electricity supply unit as well as a module calculating the compressurability of textiles to be stored or despatched in the most compact way.

### Measuring equipment with a fast return on investment

Whether used for predetermining the right size of a storage bin or a despatch carton, the required storage volume of a range of products, the suitable size of a storage position or for order surveillance via weight check, product measuring equipment is the easiest and most precise way for product data capture.

### Further advantages:

- assessment of required warehouse/storage area capacity
- data capture via barcode scanning, online data transmission
- automatic selection of the optimum despatch bin
- preview on optimum use of the storage volume provided by automated order picking installations



# Order picking with computer-aided systems

## Manual handling



Photo: KNAPP, Graz

### **Pick-to-light system** »Operator to goods«

#### **Features:**

Paperless order picking system with LED displays which lead the operating staff to the product lines and indicate the number of items to be picked. This system is particularly suited for small and medium-sized product ranges.

#### **Function:**

Every storage position is equipped with a signal lamp, a display indicating the quantity to be picked and a "job done" button. Signal lamps lead the order pickers to every storage position relevant to the order in question. The operator picks the required quantities and confirms after picking. System variations featuring a central display for slow movers are also available. Order picking performance rises to 600 picks per man hour and, depending on the case, can be as high as 1 200 picks per man hour.

#### **Benefits:**

- **Fast orientation allows a 100 % increase of picking performance. No document reading - picking with both hands possible - no document signing**
- **Picking mistakes are reduced to less than 0.15 % due to bright, large and easily legible display units directly at the picking place**
- **Seamless flow of information, constant control of minimum supply levels**
- **Fast training of new staff**



Photo: in.depend, Neuss

### **Mobile terminals** »Operator to goods«

#### **Features:**

Mobile terminals and PC's operating with radio data are connected to the warehouse management system via a broad band radio data system. In order to identify goods moved, the terminals either have an integrated bar code scanner or can be linked to an external scanner.

#### **Function:**

The radio data system covers the entire warehouse area and allows all mobile terminals, hand-held as well as truck-installed, to communicate with the warehouse management system. Any stock move is booked online so that there is no need for printed route orders or picking lists.

#### **Benefits:**

- **Due to the online connection to every truck-installed terminal, the warehouse management system can allocate the optimum subsequent picking order to the truck driver in accordance to the truck position within the warehouse at the time. This cuts down the number of 'empty' journeys to a minimum and leads to a substantial increase in truck efficiency.**
- **Additionally, reference barcode and storage position scanning avoids mistakes during infeeding, relocation and outfeeding as well as during order picking. This drastically reduces picking mistakes, which, in turn, boosts delivery accuracy and cuts down costs.**



Photo: in.depend, Neuss

### **Pick-to-voice** »Operator to goods«

#### **Features:**

The pick-to-voice system is a new variation of paperless order picking. Order pickers are "guided" to the various picking stations via a headset which is linked to a radio data terminal. After a pick is completed, retrieval is confirmed by speech.

#### **Function:**

Before every retrieval, the order picker is informed about the storage position. To make sure that the right reference has been picked, the order picker speaks the storage position into his microphone. Then he is told the number of items to be picked which he confirms after retrieval. If the operator did not understand the order correctly, it can simply be repeated.

The system also allows to handle partial quantities. The operator announces the number of actually picked items and the system processes the information and initiates refilling.

#### **Benefits:**

- **In contrast to the terminal or scanner based solution, the operator has both hands free for picking. Terminal or scanner handling is not required which gains time.**

# Order picking with computer-aided systems

## Manual handling



Photo: P + P, Schmölln

### **Datamobile** »Operator to goods«

**Features:**

The DATAMOBILE SYSTEM is a partially automated, powered and computer steered order picking system operating with radio data or infrared data transmission. Order picking is paperless.

**Function:**

Orders are picked in batches of up to 16 orders which increases picking performance to almost 300 picks per datamobile hour. If the wrong item or the wrong quantity has been picked, or if an item has not been allocated to the right bin, corrections can be made immediately "on site" during the picking process.

**Benefits:**

**Scanners and a weight check module under each bin dedicated to a particular order eliminate potential mistakes, such as wrong items or quantities picked or product allocation to the wrong bin.**



Photo: HÄNEL, Bad Friedrichshall

### **Lean-Lift** »Goods to operator«

**Features:**

The Hänel Lean-Lift system provides a high tech storage facility for parts and components. In this example, 13 Hänel Lean-Lifts accommodate 9 000 electronics components which are fed in and out according to the FIFO principle. The entire warehouse operation is monitored by the Hänel steering software.

**Function:**

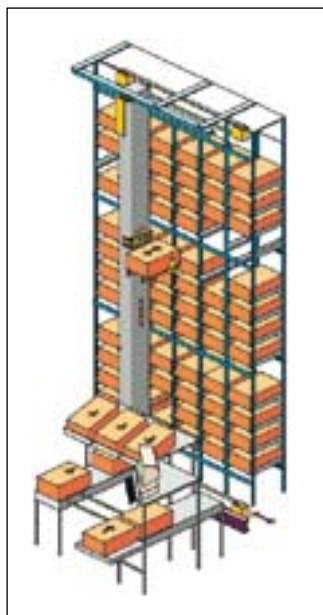
The system is able to choose the right load compartment size in relation to the size of the bin to be stored thus ensuring the best possible utilisation of capacity and available storage height. The closed system protects the goods against dust and allows in- and outfeeding by several operators at a time. All workstations are equipped with scanners to avoid time consuming input of individual numbers as well as typing errors.

**Benefits:**

**Substantially reduced working times due to fast infeeding and short access times. Capacity gains of up to 60 % can be realised as due to the allocation of the optimum storage compartment height. Good cost/benefit ratio.**



Photo: psb GmbH, Pirmasens



### **"PSB selector" system** »Goods to operator«

**Features:**

This self-contained order picking unit is equally efficient the production and on-site storage areas as well as for distribution. The modular construction allows any layout variation according to the intended purpose and building constraints.

**Function:**

The compact installation ensures fast supply of the picking stations. Fast movers are stored in lanes serviced according to the live storage principle, slow movers come to and leave the picking stations on conveyors or by vehicle. Steering and administration of this random storage system is effected by the psb selectron software.

**Benefits:**

- high throughput
- relocation to other storage areas possible
- space saving modular construction
- intelligent steering and organisation software
- easy-to-understand user guidance
- software can be integrated into a warehouse management system/ host architecture
- can be assembled and put into operation within a short time
- immediate access to goods
- low maintenance costs

# Order picking with computer-aided systems

## Automated handling



Photo: KNAPP, Graz

### **Automatic dispenser**

#### **Features:**

Reference oriented order picking system into which goods are manually replenished into vertical channels. At a collection point, the ejected items are collated to complete orders. Suited for frequently required items of rectangular or cylindrical shape. With some modifications, similar systems can be used for items with an average turnover or for slow moving products. Particularly suited to cope with daily peaks or with a high number of orders demanding only a few items per order line to be picked (city logistics).

#### **Function:**

The channels are fed from live storage installations on either side of the dispenser. A mechanical ejector pushes the required items per order onto a collecting belt conveyor which transports them to a collating station where they are directly filled into the despatch bin dedicated to a particular order. With a picking rate of 6 items per second simultaneously for all order lines relating to the same order, the system can process 2 000 orders per hour with 2 to 3 items per order line.

#### **Benefits:**

- low personnel costs
- best possible picking accuracy (error ratio < 0.01 %) and low costs for subsequent corrections
- daily peaks are no problem, refilling can be done in less busy times
- rapid response
- short training period for refilling staff

### **Picking robots for individual item picks from bins**

#### **Features:**

The DYNAMIC LOOP SYSTEM works with up to 5.5 m high robots for fully automated loading and retrieval of small parts into/from bins. As the robots can take loops, their working scope is not restricted to one aisle, i.e. throughput can be increased by simply adding further robots.

#### **Function:**

In this application, spectacles are picked from/stocked into 10 000 storage bins providing 200 000 storage positions.

#### **Benefits:**

- The picking procedure is effected directly at the storage position. For this purpose, the storage bin is pulled onto a picking tray and the product is picked automatically.*
- With this method, the distance between the storage levels can be reduced to a minimum, as no roaming space for the picking device has to be added.*



Photo: P + P, Schmölln

### **Picking robots for individual item picks off pallets**

#### **Features:**

The picking robot RoboPick was conceived for picking bulky and heavy-weight goods/packages as well as for automated order picking directly off the pallet in coldstore areas.

#### **Function:**

RoboPick order picking robots operate in renowned distribution centres and supermarket chains where they automatically retrieve fast movers and heavy loads.

RoboPick robots work in highbay installations where storage units of all lengths, widths, heights and weights have to be picked individually off pallets and placed onto a conveyor belt.

#### **Benefits:**

- reduction of stock levels
- lower throughput costs per carton/storage unit
- shorter throughput time between incoming customer order and despatch
- almost 100 % picking accuracy



Photo: Swisslog AG, CH-Brügg BE