



Logistics Association of Australia Ltd

AUTOMATED DISTRIBUTION AT BLACK & DECKER

Glenn Baird, winner of the 1997 International Study Award, presents his second report covering automated distribution at Black & Decker.

As well as attending the CLM conference, the LMA's *International Study Award* enabled me to arrange a series of visits to US firms to observe operational practices and technologies in use. One of my visits was to Black & Decker Corporation's North American Distribution Centre in Fort Mill, South Carolina.

Black & Decker operates three distribution centres in North America for both locally made and imported products. A single factory in Maryland has a small distribution centre attached and feeds the Fort Mill and California DCs.

Fort Mill is located just south of the North/South Carolina border near Charlotte, NC. The area is very popular as a distribution hub in North America because:

- The land has historically been cheap;
- Seventy five per cent of the US population is within a 600 mile radius &
- People are non-unionised and labour rates are cheap, relative to other US locations.

The Fort Mill DC occupies about 800,000 ft sq. Sixty available docks are split 26 receival and 34 to shipping.

A slider sortation system is located at the end of a three mile network of automated conveying.

Carton sorting can be completed at greater than 100 cases/minute.

Warehouse/dock utilisation is maximised by holding full and empty trailers/containers in the warehouse yard. 240 parking spaces are provided, although the average holding is significantly below this.

Storage capacity is split between:

Location type	Approx. Capacity
Bulk/Block stacked pallet locations	60,000 pallets
Racked locations (single selective)	14,000 pallets
Non conveyable locations	3,000 pallets
Pallet flow	1,200 pallets
Case flow	5,400 locations
Carousel (piece pick)	9,200 locations*
Static shelving	2,800 locations
* Configurable	

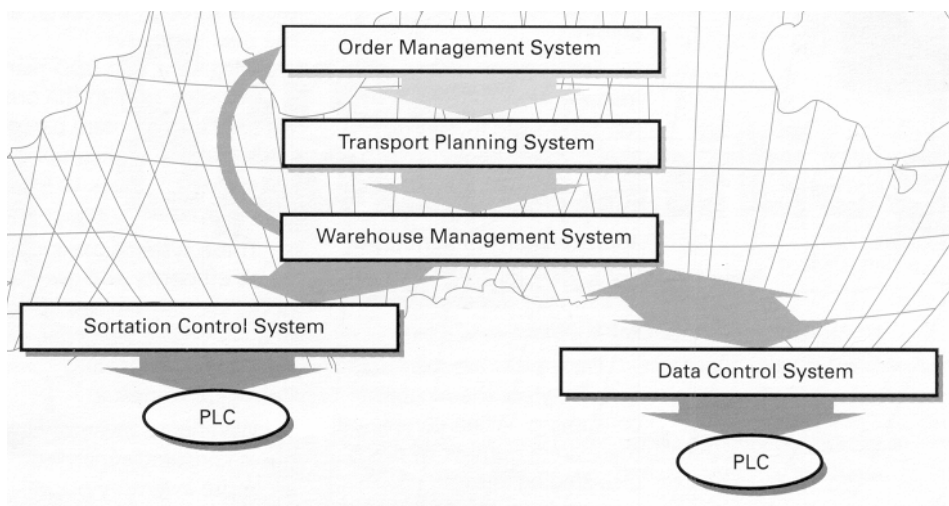
Use of wire guided forklifts in narrow aisles permits maximum space utilisation within the racked areas of the DC. These forklifts operate with 50mm clearance to the racking on either side. The forks rotate within the aisle so that the fork can put away on one side of the aisle and pick up on the other side without losing time exiting the aisle to turn around. B&D also believes the corporation can benefit from the forklift drivers being able to concentrate on identifying the stock and location rather than driving the forklift.

Receivals are of three types:

- Palletised with barcode
- Block stacked
- Slip sheeted.

Block stacked and slip sheeted receivals are palletised and barcoded at the receival point. Then, like palletised receivals, they are scanned and put away to the location nominated by the Warehouse Management System (WMS).

B&D utilised a number of systems to manage their orders and maximise the throughput of the Fort Mill DC. The diagram below outlines the Transport Planning System (TPS) 72-120 hours prior to ship date. The TPS then applies ABC priorities to the orders based on lead times and delivery date. The load Management System (LMS) and TPS interact to build trailer loads which are then released to the WMS. A "C" priority order, for example, can remain at the TPS until a full trailer load can be assembled around the order.



One of the keys to B&D's success at Fort Mill has been the integration achieved between the WMS and the Warehouse Sortation and Data Control Systems. B&D had huge start-up issues with the Fort Mill DC. Most related to an inability with the WMS alone to achieve the pick and goods flow efficiencies required to have the DC operate smoothly. There was insufficient attention paid and no allowance made for error rates and contingency plans during commissioning. Both B&D and another firm I visited replaced their DC managers during this process.

Orders at Fort Mill can require picks from any or all of the four pick areas within the DC:

- Piece picks (ie less than case volume) Eg. Replacement saw blade packs;
- Case picks;
- Pallet picks, &
- Non-conveyable picks (items that are too heavy/light/large to use the conveyor system).

Piece picking is completed using pick to light rotating carousels and flow racking. Totes are circulated on conveying systems. Each carousel, operated by a single picker, is visited once only. The order is scanned on arrival and each item is scanned into the tote. The carousel rotates to the next item as each item is scanned into the tote. Once completed, the tote is conveyed to the "repack" area where its contents are packed in cartons. The completed carton receives a barcoded order level and then is conveyed to the sortation system for routing to its loading dock.

An early learning for B&D was the time to completion differences between piece, case and pallet picking. Initially, all components of the order were released at the same time. This led to significant congestion at the loading dock while pallets waited for piece picks to be completed, boxed and delivered.

The solution was to manage work in the DC by releasing tasks in "waves". It also required hold zones to be incorporated in the piece and case pick areas. Each wave is approximately 45 minutes of work. A single order may be picked over three waves in the warehouse.

Piece picks are released first. They are the most time consuming. When completed, there are a number of piece picking staging lines (accumulation corridors) to hold the completed picks until the balance of the order is ready.

Case picks are released during the second wave. B&D utilise five separate tri-level pick to belt system in its case picking area. A continuous strip of barcoded labels is provided to each picker (two pickers per level, one each side of the belt). The labels are a consolidated pick list for orders in the current

wave. That is, each pickface is visited only once each wave. The items are sorted into orders by the sortation system above the outwards dock area.

The WSC controls the release of the stationary piece pick items so that they arrive at the sortation system at the same time as the case picks. This is during the third wave of the order, so that the pallet picks and non-conveyable picks arrive at the dock consolidation point at the time the case and piece picks are arriving from the sortation system.

The sortation system currently has the ability to read the barcoded shipment label from any of the five visible surfaces on the case (ie all but the resting surface). Detected errors or early cases are diverted for checking or recycle through the sorter at the next wave. An enhancement that B&D plans is to be able to scan the order barcode and the item barcode from the case and complete a realtime cross-check to ensure case picking accuracy.

These systems maximise B&D's efficiency and ensure docks are only consumed for one wave time per order, significantly improving throughput rates.

Warehouse inventory layout is constantly analysed by an onsite inventory planning department. Anticipated fast moving stocks are moved to block stacking areas. During receivals, the WCS checks whether there is a current pick order for the item, and subject to inventory age parameters, cancels the put away and pick transactions and moves the goods to the dispatch location. "Virtual" crossdocking is achieved by establishing fast moving corrals very close to the docks for the top five per cent of SKUs (30% of pallet picks).

Black & Decker expects that future developments and enhancements will focus on throughput improvement and maintaining world class quality and cost targets. The company will also be driven by developments with leading edge retailers' specialised handling requirements (eg adding customer price tags etc).

The company's people appeared very motivated and proud of what they achieve. Large, clear target and achievement boards support a very openly communicated daily mission.

Select 3,000 pallets, 70,000 cases and 140,000 pieces to fill 4,000 orders from 7,5000 SKUs with an onsite value of \$170 million.

I would like to thank **Scott** Richardson, North American distribution manager of Black & Decker, for making my visit to Fort Mill so valuable.