Case Study

Linfox Arnott's.

Arnott's, Linfox, Dexion: a winning partnership.

DEXION®


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ARNOTTS

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Arnott's Biscuits was established in 1865, and today operates three manufacturing sites in Australia: Arnott's Huntingwood in Sydney; Arnott's Marleston in Adelaide; and Arnott's Virginia in Brisbane, the latter of which was officially opened in 1988 after relocating from Coronation Drive in Milton.

Arnott's products have achieved a status with Australian consumers that most brands can only dream of, and the company rivals Vegemite for the title of the best-known and loved Australian brands of all times. The biscuits, including Tim Tam, Shapes, Mint Slice, SAO, Vita-Weat, Salada and Tiny Teddy are sought out by millions of consumers each day, and thus stock-outs are simply not allowable.

Until recently, products have been shuttled from the factories to various smaller distribution centres, from where Arnott's many familiar red vans have been plying the route trade, delivering the products direct to stores. In 2004, however, the company undertook a strategic review of its distribution operations and decided to adopt a new model whereby orders of full truck load quantities are delivered directly to the customers' central warehouses. The customer then undertakes the secondary transport task of delivering individual store orders from their own DC's.

The new Virginia Finished Goods DC:

System design, installation and commissioning.

In order to facilitate the new distribution model and consolidate its storage of finished goods, Arnott's commissioned Linfox to construct a new warehouse adjacent to its Virginia plant that would be able to receive, palletise and store finished product directly from the plant. Dexion worked closely with Linfox when designing the system, determining what the best methodologies were to manage the product, to track, sort and allocate it.

World's best practice was adopted to minimise the impact on production,

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and 'best-of-breed' technology has been implemented throughout the facility.

This includes:

- TGW conveyors and high-speed sorting equipment.
- Highly innovative post-sort accumulating conveyors leading to the palletising equipment.
- Four high-speed palletising robots that automatically stack the cartons.
- The latest four-axis twin servo grippers able to pick multiple cartons in one pick.
- An automated high-speed stretch wrapper and labeller.
- This high-performance application, capable of handling 6,000 cartons an hour, is designed to handle future production and to be able to recover quickly after stoppages.

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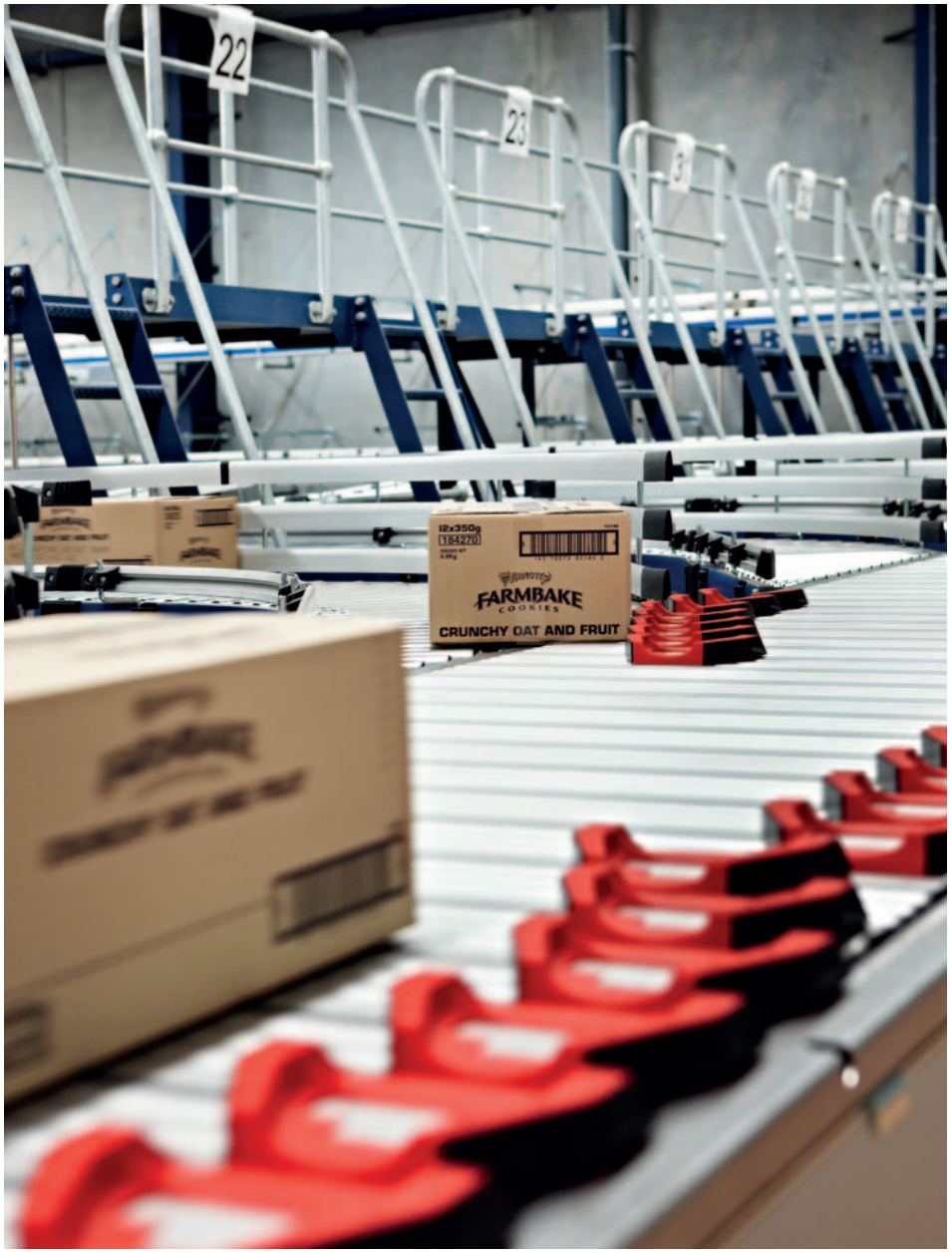
What makes this system outstanding is the degree of innovation, the unique concepts implemented here, the state-of-the-art techniques used, their contribution to Linfox and Arnott's, as well as the logistic industry as a whole.

Key features include:

1. Belt transportation conveyors for quietness and increased reliability.
2. Limited-line-pressure accumulation conveyors, minimise carton impact pressures reducing product damage associated with conveying.
3. Ability to raise or lower the speed of the system to reduce wear and tear on components and minimise energy costs.
4. Four-axis twin servo grippers which enable more cartons to be palletised in one cycle, reducing speeds and energy usage.



"With this system, Dexion has helped Linfox demonstrate that, by integrating further up and right into Arnott's supply chain, production line throughput blockages have been virtually eliminated and much-needed expansion capacity has been made available to Arnott's for other lines."

5. Parameter-driven wrap patterns by SKU, allowing Linfox to minimise the amount of wrap needed for export designated pallets, compared to those requiring higher stability for long-distance transportation.

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By adopting the latest technology and automation, Linfox has been able to deliver to very tight and rigorous key performance indicators (KPIs) with product loss due to damage in palletising markedly reduced.

Linfox Virginia:

The system in detail.

Before constructing the purpose-built site in Virginia, Linfox was operating on behalf of Arnott's four separate sites in and around Brisbane.

The new facility is 13,600 sq in size, containing 14,400 pallet positions featuring single and double configurations of Dexion selective racking. Of these, 400 pallet positions are in an air-conditioned section, which is kept at a constant chilled 18°C to 22°C range.

Arnott's manufactures 100 different product lines in the Virginia bakery next door, which are delivered across the air bridge to the distribution centre 24 hours-a-day, five and six days per week.

Both Linfox and Arnott's scan cartons either side of the airbridge. The Linfox scanner is connected to the Dexion Real-time Distribution System (RDS). This provides a preview of products coming into the distribution centre, allowing RDS to use this data to dynamically allocate products to the palletising lanes.

This is used to determine when a palletising lane can be closed for a product and the lane reallocated.

In the distribution centre the palletising comprises three main areas:

1. Carton conveying and sorting.
2. Robot palletising, consisting of four robots, each capable of servicing different product types.
3. Pallet conveyors.

Carton in-feed and sortation.

When the cartons enter the distribution centre they are scanned. This scanner is used as the audit point, to transfer the inventory from the factory to the Linfox system.

The carton in-feed conveyor, barcode scanner, shoe sorter and recirculation loop are all mounted above floor level enabling working areas underneath.

The cartons then pass to a 13-way shoe-sorter, where they are sorted by product to feed both the automated palletising robots and any manual palletising positions. Allocation of products to the sort lanes is controlled by the RDS, based on parameters of run size and throughput rate.

A recirculating conveyor loop is provided after the shoe sorter so that cartons waiting to be allocated a lane or, if the required sort lane is full, can re-circulate until ready to be diverted.

Should the amount of recirculation increase to the point where the main in-feed from product is blocked, then re-circulating product will be sent to a manual palletising/reject lane.

Four palletising robots are at the end of the sort lanes, with each robot able to handle three different palletising positions.

In addition, because the pickup head of the palletising robots can pickup multiple cartons, up to half a layer at a time, the end of the sort lane is built with right-angled transfers to assemble the required number of cartons, consistent with the pallet-build schedule for that product.

RDS controls this function, and communicates to the palletiser when an assembly is ready for pickup.

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Palletising robot optimisation.

The system retains a table of pallet configurations for each product, covering such specifications as carton assembly pattern, number of layers, carton height, and total number of cartons for a full pallet.

The RDS downloads information on what product is on the accumulation line and the robot software then determines the configurations of the pallet. This is downloaded each time a new product is allocated to a sort lane, which equates to a palletising position. A manual allocation or reallocation facility provided through the RDS Visual ensures robot capacities are not exceeded.

The RDS controls the assembly of cartons to be picked up by the robot head, and communicates to the robot when the assembly is ready for pickup. In turn the robots communicate with RDS requesting cartons in the appropriate configurations. It also keeps a count of cartons picked up and placed by the robot for each of the three palletising positions.

When a pallet is full RDS controls the release of the full pallet and the loading of a new empty pallet. If for any reason, the pallet build cannot be completed, RDS instructs the robot to pickup and place whatever cartons are left on the pallet and then release the partially completed pallet.

The installation uses four of the latest Motoman EPL300 palletising robots from Robotic Automation. These robots feature the latest in technology, having the largest working envelopes in the world and one of the fastest cycle times available for a palletiser in their class.

In this application, Linfox has opted for Motoman's four-axis servo type grippers, which are able to handle the full Arnott's product range. In addition, operators can configure a number of palletising variables such as carton dimensions, gripper allowances, robot speeds, and all while transferring cartons to the pallet.

Pallet handling system.

Empty pallets are transported to a pallet dispenser adjacent to the robot shuttle in-feed assembly, where they are arranged in stacks. Pallet stacks are loaded onto the empty pallet in-feed conveyor by forklift. An automatic empty pallet in-feed shuttle picks up empty pallets from the dispenser. Having delivered an empty pallet, the shuttle will always retrieve another empty pallet from the dispenser and return to the home position.

"The GUI is web enabled, so it can be used by supervisory staff to monitor conveyor system performance, investigate errors, and to reset alarms."

The full pallet outfeed shuttle, having picked up a full pallet, delivers it to one of two outfeed points. One is for full pallets and the other for part pallets and reject pallets. Again, RDS co-ordinates and controls both shuttles' movements in conjunction with releasing pallets from the robot palletisers.

Since RDS monitors all functions of the robot palletisers, it is able to predict the release of a full pallet and have the shuttles in position to do the changeover.

Processing after palletisation.

RDS keeps the carton count and tracks the pallets leaving the palletisers. When a pallet is unloaded from the output shuttle it is moved to be stretch wrapped, and a scanner verifies the product on the pallet.

The stretch-wrapper is a rotating head type, where the wrapping head rotates around a stationary pallet and is slowly raised to accommodate the pallet height. The stretch wrap machines have a degree of inbuilt intelligence. For example, if the pallet is being prepared for export it will only very lightly wrap the pallet to hold it together, because that wrap will be coming off and the cartons hand-stacked into containers. There are also further settings available of which Linfox use two – one for a product that needs a very tight wrap, and one for normal.

After the wrapper the pallet passes to the label printer applicators, of which there are two: one on each opposite side of the pallet. RDS generates the SSCC pallet label and controls the action of the printer-applicators.

Wrapped and labelled pallets are finally unloaded from the conveyor via forklift – with all operation from then on managed via Linfox's SAP warehouse management system (WMS).

Any incomplete pallets released from the palletisers are automatically sent to the reject line with the RDS knowing the pallet is incomplete. No wrapping, printing or checking is done and the pallet passes straight to reject. All actions relating to less than full pallets loads are managed via SAP WMS.

Manual palletising.

Cartons sent down the manual sort lane of the shoe sorter are placed on pallets by product. The operator then finalises the pallet by stretch wrapping, and printing and applying the labels. The carton count is then entered so that pallet inventory is updated correctly – all functions executed on the WMS.

"When an order is picked, to reduce the incidence of errors, the Linfox system ensures that a cycle count is conducted after the product is picked."

Dexion RDS features.

Dexion's control system provides a web-based 'visualisation tool' providing the following functionality:

- A graphical representation of the sorter and infeed/outfeed conveyors.
- Stop and start controls.
- Conveyor status.
- Jam alarms.
- Lane full status for each outfeed lane.
- E-stop notification.
- Scan status.
- Critical PE cell status.
- Alarm history.

Dexion Graphic User Interface (GUI) facility.

The GUI is web enabled, so it can be used by supervisory staff to monitor conveyor system performance, investigate errors, and to reset alarms. The panel-view control system shows the system status in real time and can be used to suspend, stop and resume many parts of the operation. Conveyor graphics and control of the system are via a touch screen panel situated on the operator's platform.

Put-away in the warehouse.

Each pallet has had two SSCC labels applied, used from the point of pick-up, where the forklift operator picks up the pallet and scans the labels. These labels are used right through to the movements within clients' distribution centres.

Once the SSCC is scanned, the Linfox warehouse management system (WMS) determines where the pallets are to be stored and Arnott's inventory is updated. Fastest moving product is placed on the lower parts of the rack, medium in the centre, and the slowest in the top positions.

SAP WMS also places products for export in a specific section of the warehouse, while part pallets are guided to areas where they'll be used according to rules set up by Linfox and Arnott's. The system also ensures that correct date rotation and customer requirements are adhered to. Product is never released until instructed by Arnott's and if any product is restricted, the system blocks the pallets. These systems are in place to ensure the product remains in peak condition and Arnott's QA rules are adhered to.

The Linfox distribution centre is driven by a wireless Radio Frequency (RF) system running under SAP.

Managing stock in the warehouse.

When an order is picked, to reduce the incidence of errors, the Linfox system ensures that a cycle count is conducted after the product is picked. The picker is directed to a pallet via the RF unit, the location is scanned to ensure it is the correct location and the required number of cartons are picked.

Linfox adopts a 'Keep It Simple' (KIS) approach to picking, under which the picking operator will count the layers and the cartons remaining, and then if they've got it correct the system allows them to move on. If the operator counts incorrectly, the system allows a second attempt. If the count is incorrect a supervisor is called to check the pallet.

It might be that an extra carton was incorrectly placed in a previous order and the carton is found there. The system also identifies those pickers who constantly make errors, so they can be moved to another area of the operation.

Over a period of three to four weeks, every position within the warehouse is counted, with the pick face counted on average every day.