



WHITE PAPER

MEAT

Automation for Maximized
Production in Meat Warehousing



swisslog

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Meat product manufacturers and distributors need to provide increasingly efficient storage and throughput of fresh meat products, deli meats, and frozen and canned meats to keep up with changes occurring in the meat supply chain. To meet the challenge, streamlined material handling technologies are becoming more widely utilized to speed throughput, improve cost efficiency and maintain more precise product tracking.

Meat product manufacturers, as well as distributors and stores, are being confronted with a market shift that is putting tighter demands on the operations of the meat supply chain. Because of increasing consumer interest in a more diverse meat product selection, meat processors are supplying a widening array of new fresh meats, deli meats, and frozen and canned meats, which is impacting the structure of how meat products have been distributed for decades. This is presenting a challenging scenario for those that manage the warehousing and distribution of meat products.

To accommodate this growth of meat SKUs, an increasing number of meat product producers have turned to more streamlined automated storage and distribution solutions to better ensure timely and accurate product handling.

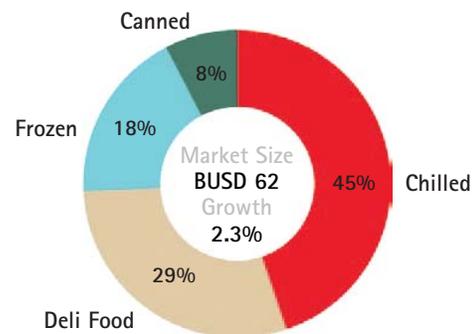


Fresh meat from the farm to the shelf

This paper examines some of the latest warehousing and distribution technology being employed in a number of meat production and distribution facilities that have successfully adapted to the recent distribution challenges in the meat supply chain.

The Growing Market for Meat

According to Datamonitor Industry Profile, Global Meat 2011, the global consumption of meat products is estimated to be 62 million tons in 2011, and expected to reach annual growth rates exceeding 2.3 percent. 74 percent of total worldwide meat consumption in 2011 is estimated to be from chilled meats. Chilled fresh meat accounts for 45 percent of total meat product sales. Chilled deli meats, such as salami and other cold cuts, represent 29 percent of total meat volumes purchased. Frozen meat products constitute 18 percent of total consumption, and ambient temperature canned meats is 8 percent of the total market.



Global meat market segments: % share, by value, 2011(e)
Source: Datamonitor 2010

Sales of lamb, pork, beef, chicken and turkey are being fueled by the diversification in meat SKUs. This includes such products as flavored and spiced fresh meats and cold cuts, and ready-to-eat meat entrees, both chilled and frozen. The expanding diversity of packaging options being offered to consumers for fresh and frozen meat products continue to make their way onto retailers' shelves. And, the increase in retailer private labeling is prevalent in just about every meat product line.

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Changing Dynamics of Meat Distribution

The need to deliver the right product at the right time, to the right place and with the right quantity is critical in the meat distribution supply chain. Sell-by dates, temperature control, government regulations and anticipating future warehouse flexibility are factors influencing meat producers and their warehousing operations.

The meat supply chain is shifting and adapting in a number of ways:

- a) Stores are adapting to carrying an increased number of SKUs as meat producers introduce more variations of fresh meats, deli meats, and frozen and canned meats.
- b) This has prompted stores to place more frequent orders to meat producers for smaller quantities of a larger number of SKUs, as store inventories are kept at reduced levels. This is necessitating shorter lead times for ordering from manufacturers.
- c) Manufacturers are having to speed up their warehousing and distribution turn-around times to handle the higher volume of SKUs and just-in-time ordering of retailers. This has pushed meat producers to ship direct to stores to cut transport time, while bypassing distribution centers.
- d) More stringent supply chain track and trace requirements are being established by governments in Europe and the United States to ensure better meat product reliability. Meat product manufacturers are required to date meats after packaging, and track them through warehouse storage, picking and shipping to the stores. Some meat products are now requiring source tracking prior to plant receipt.
- e) Improving sanitation in the meat warehouse is an issue of growing importance. Fresh meat products, once packaged, are not in direct contact with the material handling equipment used in the warehouse. The design of this equipment, however, must anticipate potential leakages, and meet wipe-down or heavy wash-down criteria to maintain cleanliness and sanitation.

Wipe-down conveyors, for example, are designed so if a food spillage occurs the conveyor system can be easily wiped down on the surface and along the side of the conveyor. The conveyor structure would typically be stainless steel or plastic, a sanitation upgrade over standard aluminum conveyors found where food contact is not an issue.



Improved sanitation with wash down conveyors

Heavy wash-down conveyors are used where it is anticipated that food will come in direct contact with the conveyors through standard product handling. Equipment is designed to endure heavy exposure to water applied with a high pressure, high volume hose, along with cleaning agents on a daily basis. The entire system, including the motor assembly and control electronics, are usually designed for thorough cleaning.

Transport units, such as totes, crates and pallets can be made of plastic. These are suitable for heavy wash-down procedures to comply with sanitary regulations for cleanliness.



Plastic crates and pallets applied in meat warehousing

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Design improvements in sanitation can include the minimizing of horizontal frame surfaces which reduce areas where contaminants can collect. For bolt-on equipment, eliminating 90-degree steel bends during construction, and instead using 45-degree steel strength bends which allow food particles to pass through more easily. These features simplify and expedite the cleaning process in fresh meat warehouses.

The Move to Automation

Industry supply chain changes in the meat processing sector are driving technology trends in the warehouse. Highly flexible systems that respond quickly to more frequent and changing retail orders are being implemented.

a) High-density storage is being utilized to improve energy efficiency in the chilled and deep-freeze warehouse environment. High-bay automated storage and retrieval systems (ASRS) allow more pallets to fit into a denser cube of space to reduce refrigeration costs while speeding up order throughput.

b) The introduction of standardized transport units to reach the next level of efficiency is critical. Meat distribution utilizes plastic totes and crates for carrying SKUs of fresh meats. These are then transported on dollies to stores. For frozen and canned meat products, cases are stored and transported on pallets. Each of these formats require specialized handling, and meat warehouses can integrate a variety of automated storage and picking approaches to optimize handling of these products.

c) Increasingly important is the demand for fully automated picking to ensure direct store deliveries, and to avoid labor issues. Such as robotic layer picking that fulfills the need for less than full pallet deliveries. And, fully and semi-automated light goods technology for tote/crate and case picking solutions that also minimize labor challenges.

d) Modular and energy efficient conveyor systems move totes/crates, cases and pallets through the warehouse with unprecedented throughput while maintaining product integrity.

e) More electronic data interchange is needed within the supply chain to keep track of fast moving meat deliveries. The latest warehouse management systems (WMS) smoothly integrate with the meat plant's upstream production output and the supply chains' regional DCs, as well as downstream to the retail stores.

Improved throughput productivity at meat processing warehouses and the ability to deliver more SKUs in store friendly formats with increased speed and accuracy, these are the key benefits that streamlined automation delivers. The most successful meat product producers are embracing these new supply chain challenges with automated systems.

Pallet Technology Streamlines Handling of Frozen and Canned Meats

Meat product manufacturers need to provide increasingly efficient storage and throughput of high volume SKUs, such as frozen and canned meats, stored in warehouses on pallets. For handling these loads, ASRS, robotic layer picking and other technologies are becoming more widely utilized to speed throughput, improve cost efficiency and maintain more precise product tracking.



Multi-deep storage of frozen meat products

ASRS for High-Density Pallet Handling – ASRS are computer controlled systems for automatically depositing, storing and retrieving pallets from defined storage locations. They allow inventory to be moved quickly, safely and precisely within a warehouse environment.

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High-bay systems optimize cubic space usage, not only by their vertical stacking capability, but also by minimizing aisle cubic footage.

By eliminating the need for forklift trucks, aisles can be made significantly more narrow, allowing up to 3.7-meter (12-foot) wide aisles to become just 1.5-meter (5-foot) wide. This space can then be used for more pallet positions.

The latest generation of automated pallet cranes provide a uniquely flexible and modular design that is equipped with a multiload pallet handling capability, ideal for moving pallets of meat in ambient temperature and deep-freeze environments. High-bay warehouses are used for high-volume SKUs, whereas miniload systems are applied for faster moving fresh meat products transported in totes or crates.

These ASRS systems allow rapid configuration to the right storage and retrieval need for any meat storage application. From floor level to up to 40 meters (131 feet) tall, most stacker cranes can provide single-deep, double-deep, triple-deep and multi-deep pallet stacking, with the flexibility to handle one load at a time or multiloads.

When a pallet is on the load handling device it is carried off the pallet crane into the rack. Conventional ASRS machines only go one or two pallets deep, using a fork attached to the machine. But some systems can go three pallets deep utilizing a telescope fork. Then, with a satellite remote unit they can run a pallet 12 meters (40 feet) into the racking, as much as 10 pallets deep or more.

Pallet cranes are now designed to deliver energy efficiency. They are typically optimized for peak throughput, performing many moves in and out of the racking, and also generate electricity from lowering their lift carriages, using their motors as a generator. The power gained is used to aid horizontal travel. The system can also contribute energy when braking during horizontal travel to aid vertical motion. This energy regeneration both reduces the ASRS' total power usage and, with other measures, can reduce the size of incoming supply required.

The most advanced models of ASRS use integrated controls architecture for material flow control, enabling optimized speed and precision positioning. Infrared or wireless is used to communicate between ASRS units and the control system, which instructs the ASRS where to place incoming pallets, and where to retrieve them for shipping.

Because of today's precision of the crane controls and its integration with the warehouse management system, the crane always selects the correct inventory, quantity, and they always rotate the product properly.

These automated cranes integrate with other automated equipment in the warehouse creating one single, efficient transport system that provides optimum throughput under any system capacity.

Robotic Layer Picking Accelerates Order Fulfillment – Meat producers, faced with the increasing demand for less than full pallet deliveries, can achieve a first level of automation with robotic layer picking. The robot can efficiently build layers of different SKUs on a pallet in the exact order quantities and delivery sequences required by retailers. The system operates with a high level of flexibility and error-free picking.

Pallet Conveyors Ensure Flexibility – Transporting pallets throughout the meat warehouse with optimum flexibility and efficiency requires modular conveyor systems capable of continuous operation in chilled, deep-freeze and ambient temperature environments.



Flexible and efficient pallet conveyor system

Such conveyor systems provide a unique flexibility for integrating automated systems within the meat warehouse into a continuous fluid throughput. In addition to connecting major material handling systems like high-bay ASRS, these conveyors enable a unique flexibility of configuration with elements like chain conveyors, roller conveyors, transfer units, turntables, vertical conveyors, and pallet carriers and dispensers within various sections of the warehouse.

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Modular conveyor systems can integrate shuttle cars in a variety of functions, such as feeding multiple order picking stations and for use in staging areas. They can utilize profile gauges to measure pallet dimensions and weight without stopping the load, and can be used at entry points to prevent incorrect load units from entering into the system.

Light Goods Technology Speeds Throughput of Fresh Meats

Fast turnaround of chilled, fresh meat products and deli meats requires efficient handling with timely precision. Fresh meat products must move through the warehouse, from storage through picking and shipping, with a typical turnaround time of less than two days. Specialized automated systems for handling light goods in totes and crates provide the high throughput and superior efficiency required.

Miniload Cranes Provide Efficient Handling of Meat Products

– Miniload crane systems of various configurations and capabilities are equipped to pick and move totes/crates and cases of meat products. They employ lightweight, high-speed cranes that transport individual cases, totes or trays supporting goods-to-person pick stations. As result, high tote and case pick throughput in the meat warehouse environment can be realized.

Miniload Shuttle Systems for Rapid Picking of Diverse SKUs

– Some recently introduced versions of miniload shuttle systems have significantly increased speed of order processing, at constant high accuracy. These systems provide very high throughput and cost efficient distribution, while delivering a high density of storage capacity and increased modular flexibility. Some miniload shuttle systems are exceptional for their ability to consolidate and release totes to picking stations at high rates in required sequences.

Light Goods Conveyors for Seamless Integration

– Light duty, modular conveyors are necessary to connect miniload systems to pick stations and shipping. Some of the latest of these conveyor systems are designed with a sustainable, modular design and smart controls for high performance light goods handling. Designed to be plug and play for handling totes/crates and cases, they feature integrated energy management systems.



Modular light goods conveyors

Pick Systems Support Meat Operations – Picking of meat products is frequently based on both person-to-goods and goods-to-person systems for picking totes/crates and cases. Semi-automatic systems for case picking increase productivity in person-to-goods and goods-to-person systems.

Person-to-goods picking using RF-terminals to guide pickers enables high pick rates and order selection accuracy. For high SKU count and high pick volumes, multi-floor pick levels increase pick facing and storage density.

Goods-to-person picking stations are designed to reduce ergonomic issues. Enhanced goods-to-person workstations reduce the strain on specific parts of the human body. Workstations are generally designed to make the picking of products physically easier, which ultimately will affect performance. These systems integrate seamlessly with light goods conveyors, automated buffers and order fulfillment systems to ensure high pick rates.

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WMS for Integrated System Control and Product Tracking

Meat processing warehouses provide precise and efficient tracking of products because of their highly automated and computer controlled systems. The warehouse's WMS, along with controls in the ASRS, miniloads, pick systems and conveying systems are capable of monitoring batch numbers, production dates and weight as the transport units are stored and moved through the facility.

After processing and packaging, meat products are moved into the warehouse before shipping. The most highly automated warehouses know precisely the characteristics of each product, as well as how many pallets, totes, crates, cases, and individual SKUs are entered into storage. Such integrated WMS ensures optimized storage by distributing SKUs over multiple aisles, improving delivery execution and maximizing labor resources.

Ordering IT systems are increasingly being integrated between retailers, manufacturers and distributors. Meat products are now almost always produced to order and streamed straight through the supply chain.

Temperature controlled meat products can be monitored throughout the whole supply chain – at the manufacturer, through the regional DC and until the shipment is received at the store. Data loggers and/or radio frequency identification (RFID) are technologies used.

Proven Meat Handling Solutions

Automated order release modules (ORM) buffer individual totes/crates or cases in lanes and release SKUs in the correct quantities to dollies, or to a palletizing station.

With one order release module system, the receiving of the totes/crates is done by induction stations where inbound loads are automatically depalletized. Stacks are then transported into a stack buffer operated by gantry robots. The stack buffer system provides efficient batch picking of all active orders within the robot module. Articulated arm robots then consolidate these into finished order stacks. These are automatically loaded onto outbound shipping carriers – dollies or pallets – in the exact sequence required.



Gantry robot operating stack buffer

Robotic systems for automated order picking for a distribution model based on returnable plastic crates, reduces the space, labor and time required for organizing large quantities of products for picking. Robots select cases for order lines that are less than one pallet. It is used to order-pick full crates, which are then transferred to conveyors.



Order consolidation with articulated arm robot

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SUMMARY

Meat processors are supplying a widening array of new fresh meats, deli meats, and frozen and canned meats to retailers. This market growth is putting tighter demands on operations.

To accommodate this increasing number of SKUs, producers have turned to more streamlined automated storage and distribution solutions to better ensure timely and accurate product handling. Some of the latest systems for meat producers and distributors include:

Pallet Solutions for Streamlined Product Handling

ASRS for High-Density Pallet Handling – These high-bay systems are ideal solutions for the efficient storage and throughput of high volume SKUs, such as frozen and canned meats stored on pallets. Swisslog's Vectura crane provides a uniquely flexible and modular design with multiloading remote pallet handling capability. The system fulfills the need for almost any application and provides single-deep, double-deep, triple-deep and multi-deep storage.

Pallet Conveyors Ensure Flexibility – Transporting pallets throughout the meat warehouse with optimum flexibility and efficiency requires a modular conveyor system capable of continuous operation in ambient temperature, chilled and deep-freeze environments. ProMove, from Swisslog, for moving pallet loads with speed and precision, provides a unique flexibility for integrating automated systems within the meat warehouse.

Light Goods Solutions for Rapid Throughput

Miniloading Cranes Provide Efficient Handling of Meat Products – With Tornado, Swisslog provides one of the fastest miniloading cranes in its class. Consistent weight optimization, modern control technology and an energy-saving design support the high throughput demands of cases and totes/crates required in the distribution of meats.

Robotic Picking of Totes/Crates – MultiPick is a Swisslog robotic solution for automated order picking. Designed with gripper heads and controls for a distribution system based on returnable plastic totes, crates. MultiPick reduces the space, labor and time required for organizing large quantities of chilled meat products for picking.

Storage & Transport System for Rapid Picking of Diverse SKUs – Swisslog's SmartCarrier, the latest generation of streamlined storage & transport system for picking of light goods, is exceptional for its ability to consolidate and release totes at high rates in required sequences. Its extreme modularity has the flexibility to integrate exterior pick stations into its system.

Modular Conveyors for Light Goods – QuickMove, a Swisslog conveyor system with a sustainable, modular design and smart controls for high performance light goods handling with zero pressure accumulation. Designed to be plug and play for handling totes, crates and cases, it features an integrated energy management system.

Proven Meat Handling Solutions

Optimized Order Fulfillment – Swisslog's StackRunner solution is based on the buffering and stacking of totes and crates in chilled meat warehouses. High-speed overhead gantry cranes cover the buffer area and assemble or split stacks. During order picking, the cranes retrieve required crates/totes for several orders (batch picking) and substacks are distributed to StarRobot cells. The articulated robots consolidate these into finished order stacks, which are automatically loaded for shipping onto outbound dollies in the exact sequence required.

ABOUT SWISSLOG

Swisslog (www.swisslog.com) is a global provider of integrated logistics solutions for warehouses, distribution centers and hospitals. The company has considerable know-how and special expertise within the meat processing sector. Its comprehensive services portfolio ranges from building complex warehouses and distribution centers for food manufacturers, wholesale distributors and retailers, to implementing Swisslog's own technology for intra-company logistics solutions with an extensive number of projects realized.

Swisslog's solutions optimize customers' production, logistics and distribution processes to increase flexibility, responsiveness and quality of service while minimizing logistics costs. With years of experience in the development and implementation of integrated logistics solutions, Swisslog provides the expertise that customers in more than 50 countries around the world rely on.

With Global Headquarters in Buchs/Aarau, Switzerland, Swisslog currently employs over 2 000 staff in 20 countries worldwide.

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