Cold storage:

Managing a cold storage warehouse successfully is a balance between maintaining the right temperature and maintaining throughput.

By Lorie King Rogers, Associate Editor

Keep your cool

When it comes to our homes, most of us want to keep the cold out. When it comes to operating a cold storage warehouse, the challenge is to maintain the right cold storage temperature for the product inside while keeping personnel and equipment warm enough to perform well and function at optimal capacity.

Refrigerated and frozen food accounts for the majority of the product being stored in cold storage facilities—the global frozen foods market alone is expected to grow from an estimated $165.4 billion in 2009 to $199.5 billion by 2014. However, cold storage is also important to other industries, including pharmaceuticals, petro-chemicals and even some high-tech electronics.

As the need for cold storage continues to grow, so does the need for strategic solutions that keep the product cold and the operating costs from heating up.

Warm solutions

The cold can take a toll on people and the equipment used to keep product moving inside the frozen four walls, but there are a number of ways to maintain efficiency in an extreme working environment.

For instance, the buttons on scanning devices designed for cold storage facilities are big enough to be felt through work gloves while touchscreens are sensitive enough to respond to a gloved touch and still enable the exchange of information.

The cold can also affect how well the battery in a handheld scanning device functions. "Constant exposure to the cold has a negative impact on battery life, resulting in a 40% to 50% degradation to the life of a battery," explains Mike Wills, vice president of North American sales for Psion. "The question is how long will the device work until it decides to give up the ghost."

For that reason, devices used in cold storage are manufactured with seals designed to withstand temperature changes from the freezer to ambient conditions that can cause condensation to build up. Similarly, Wills adds, a heat source inside a handheld computer can keep the device's internal temperature from getting too cold.

Electric lift trucks are also affected by the cold: When operating in cold environments, the average lift truck battery life cycle and rate of charge can decline by 20% to 50%, meaning a battery rated for an 8-hour cycle in ambient warehouses might only last 4 to 6 hours in the cold. One solution, suggests Perry Ardito, general manager for the Jungheinrich warehouse products group with MCFA, is to use a higher voltage battery to improve run-time. "A battery rated for 12 hours

Automated solutions can dramatically reduce space requirements, energy consumption and labor, but some equipment—like handheld bar code scanners (inset)—may require special heating and ergonomic features to operate efficiently.

in ambient conditions, will still operate for a full shift even with a 25% cycle reduction," Ardito says.

Divide and conquer temperature ranges

Energy savings is a recurring theme in cold storage because it's more expensive to cool air than to heat it. At the same time, different products require different temperatures. For example, vegetables can be stored at 55°F, dairy products are stored just above freezing at 34°F, meat is stored just below freezing at 28°F and ice cream is stored at –10°F.

That can create challenges for third-party logistics (3PL) providers who may on-board or off-board clients throughout the course of the year with different storage requirements. "In the cold storage environment, reconfiguring space isn't as simple as it is in a conventional warehouse because you have to take temperature into account," explains Ray Stahnke, account manager at Randall Manufacturing.

For warehouses that require multiple temperature zones or where the mix of products being stored changes with the season, a modular curtain wall system is a flexible, low-risk option that can go up, come down and be moved from building to building as business needs change." Refrigerated air is expensive, so once you make one change to the room or a wall, cost savings is realized," Stahnke adds.

Automate for savings

As the cost of energy, land and labor climbs, operators of cold storage warehouses are increasingly looking to automation to control costs.

"There are a growing number of automated point solutions that can drastically reduce escalating operational costs," says Jeff Hedges, director of business development for Dematic. In some instances, automation can reduce space requirements by as much as 50%, reduce energy consumption by 80% and labor as much as 70%.

Those savings are realized in a variety of ways.

Maximize the cube with dense storage: Automated storage and retrieval systems (AS/RS) are finding a home in cold storage facilities. The high-density, rack-supported storage provided by an AS/RS allows for deep and tall designs that maximize the cube of a facility and minimize a facility's footprint.

What's more, a carefully planned AS/RS can service a facility's needs for a number of years without an expensive expansion. "Customers who have cold

An automated system moves pallets through a small opening that is immediately sealed once it passes through, reducing the opportunity for expensive cooled air to escape and ambient air to enter.

The high-density, rack-supported storage provided by an AS/RS allows for deep and tall designs that maximize the cube of a facility and minimize a facility's footprint.

storage needs generally have very specific requirements that are unique to their business," explains Bob Novak, area market manager for Interlake Mecalux. Whether building new or working within an existing facility, Novak says an analysis should begin with determining your needs now and three to five years down the road.

Control heat loss: High-density storage not only creates a smaller area to cool, it also creates an environment that minimizes heat loss. A smaller footprint, for instance, translates into a smaller roof, says Bill Leber, director of business development for Swisslog. "Since the roof is one of the places in an operation where air can escape, it literally pays to keep the area as small as possible," says Leber.

Finally, automated storage also minimizes the amount of warmer air that enters the temperature controlled area, explains Dan Labell, president of Westfalia. In the case of pallets, an automated system allows for the ingress and egress of pallets through a small opening that is immediately sealed once the pallet passes through. "The warmer the product is upon entering, the more it draws on refrigeration cost, so you have to design for that," Labell says.

Automate palletizing: Palletizing is another area of operations in cold storage that is ripe for automation thanks to advancements in robotics, says Brian Keiger, logistics account manager for Kuka Systems. "For years, frozen product manufacturers have struggled with the challenges of palletizing their frozen products efficiently and cost-effectively," says Keiger. "In the past, due to limitations of the robots, product had to come out of the freezer to be palletized, and then conveyed back into the freezer." Every trip back and forth into the freezer could result in the introduction of ambient air that would have to be cooled.

New robot technology, cables, seals, energy supply and lubricants specifically designed for the harsh freezer environment enables palletizing to be done inside the freezer without protective heating shrouds. That eliminates conveyors and ice build-up on the products while minimizing the handling of frozen goods by workers in sub-zero temperatures. ☐

Companies mentioned in this article

DEMATIC: dematic.com
INTERLAKE MECALUX: interlakemecalux.com
JUNGHEINRICH: jungheinrich.com
KUKA: kuka.com
PSION: psion.com
RANDALL MANUFACTURING: randallmfg.com
SWISSLOG: swisslog.com
WESTFALIA: westfaliausa.com