

CASE STUDY



DRY FLOORS AND ENERGY SAVINGS IN FROZEN FOOD STORAGE — SHAW'S SUPERMARKETS DISTRIBUTION CENTER, WELLS, MAINE

BACKGROUND

The northern distribution center for Shaw's Supermarkets was opened in 1984. It includes 400,000 sq. ft. of grocery space to serve 55 stores, and 140,000 sq. ft. for frozen food, serving 86 stores. Loading operations proceed at high speed for 24 hours a day, seven days a week. Steve Cox is the Facility Manager. He has supervised the building since its planning began in 1982, and he continues to lead the facility today.

One aspect of building operations had been a constant irritant for Steve and for his associates ever since the building opened. As in many similar frozen food warehouses, excess moisture caused problems during most of each year.

Above: At the Shaw's frozen food distribution center in Wells, Maine, Munters DryCool desiccant units keep floors dry and save energy by reducing defrost cycles.

THE PROBLEMS

As humidity rises, the cold floor and walls in the loading dock area condense moisture, forming a wet, slippery film. That condensation made high-speed operations difficult and unsafe.

Also, the thick, counterbalanced dock doors condensed water internally. The extra weight changed their balance point. Workers had to push the doors up and prop them in place with poles, slowing operations still further.

Walls and storage racks near the doors inside the -10°F storage area constantly formed frost several inches thick, forcing weekly removal by hand, and risking product quality.

Finally, when humidity was high, the loading dock coolers needed defrosting five times each day, wasting electrical power and increasing operating costs.

To solve these problems, Shaw's installed Munters DryCool desiccant systems to reduce humidity in the dock area.

THE SOLUTION

To eliminate the dangers presented by floor condensation, Steve Cox called on Andy Hayes, Shaw's Corporate Energy Manager. For many years, Andy has used dehumidification to save energy in Shaw's retail stores. He reasoned that the loading dock safety problems could be solved with the same Munters desiccant technology that had been proven to be cost-effective in supermarkets.

More than 95% of the moisture load on the dock and storage facility comes from humid air infiltrating through the cracks between truck vans and dock cushions at the truck loading doors. The dock area is divided into two separate 13-door sections, each measuring 300' long by 45' deep. Andy and Steve decided to install a separate dehumidification system in each section.



the loading areas.

To ensure that the dry air was used to greatest advantage, supply duct work was arranged to blow air down across the wall at the rear of the dock. After it hits the floor, the dry air moves forward towards the truck doors, and then up the front wall to the return ducts, which are located near the ceiling. That circular air pattern ensures that the humidity leaking in at the dock doors will be pulled into the dehumidification system before it can infiltrate into the frozen food storage area. Also, the driest air—the air leaving the dehumidification system—is always flowing over the coldest surfaces, which include the walls and floor near the doors of the storage area.

The storage area is held at -10°F , and the loading dock is cooled to $+35^{\circ}\text{F}$. The Munters DryCool systems are sized to maintain a dew point of 27°F in the



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dock area, which corresponds to a relative humidity of 70%. Since the dew point is very low, condensation is greatly reduced. Any minor condensation near the truck doors is quickly dried off by the low-humidity air blowing through the area. The loading dock is now dry all year long. Before installation, the floors were wet almost continuously.

The DryCool systems remove moisture as long as the dew point in the dock area is above 27°F . When moisture falls below that level, the units are shut down to minimize energy consumption.

The systems have achieved their primary purposes of improving safety and reducing the risk of worker's compensation claims. In addition, as anticipated by Andy Hayes, the systems have saved energy by reducing the moisture load on the cooling systems. For example, the loading dock coolers typically needed defrosting five times each day during summer weather. Now a single cycle per day is sufficient. Also, the evaporators which cool the storage area used to require defrosting eight times a week, but now three cycles each week suffice.

Based on the local gas cost of 66¢ per therm and the average electrical cost of 8.5¢ per KWH, Andy Hayes has measured a \$25,000 net reduction in warehouse operating costs for the first six months of system operation. That result almost doubles the conservative savings estimate made by Munters before the systems were installed.

BENEFITS

■ Reduced Risk of Injury

Keeping the loading dock dry avoids the water film that can be so hazardous in high-speed loading and unloading in frozen food warehouses. Morale improves, and legal liability risks are reduced.

■ \$25,000 Cost Saving in Six Months

By keeping the loading dock dry, the moisture load on the cooling systems is considerably reduced. At this facility, the system now operates so efficiently that the company has measured and documented net savings of more than \$25,000 in the first six months of system operation.

■ Faster, More Efficient Loading

Since the dock surface is dry, warehouse operations can move more quickly, saving labor hours.

■ Improved Sanitation

Keeping surfaces clean and dry greatly reduces the potential for mold, mildew and other microbial growth, reducing risks to both Shaw's staff and to consumers.

■ No More Chipping Ice Off Floors, Racks or Product

Before the DryCool systems were installed, Steve Cox had to assign a maintenance technician to chip ice off of racks and doors once a week; with humidity under control, that unpopular, unsafe job is gone forever.