

### *Carolina Food Processors Credits Faster Production and Much More to “the Largest Ductsox™ Installation in the World”*



*Cool air is evenly dispersed through Ductsox™ fabric ducts, providing a draft-free, comfortable working environment in Carolina Processing's ham boning room.*

Carolina Food Processors operates one of the biggest meat processing plants of its type in the world. The one- and two-story structure stretches nearly a mile in length and occupies approximately one million square feet on an 880-acre site in Tar Heel, North Carolina. Within this facility hogs are processed into prime cuts for distribution to meat processing plants around the globe.

Carolina Food Processors is a subsidiary of The Smithfield Packing Company, renowned producer of top quality hams and other pork products. Smithfield employs 11,000 people, more than one-third of them at the Tar Heel plant. The company markets through a variety of distribution channels in North America, South America, Europe and Asia, generating sales of about \$2.2 billion annually. Nearly \$1 billion of this is attributed to its North Carolina division.

Plant cooling is obviously a top priority in meat processing operations such as this. Precise

temperature control is essential to ensure optimum product quality, as well as compliance with U.S. Department of Agriculture (USDA) and Food and Drug Administration (FDA) regulations.

When Smithfield's Virginia-based corporate management made a market-based decision to ramp up production at the Tar Heel plant, additional hog coolers were built that would enable processing of at least 26,000 carcasses per day. To handle the increased volume, it was necessary to improve the efficiency of the coolers' air dispersion system. In addition, management wanted to eliminate cold air drafts and improve employee comfort in one of the large conversion areas.

Phil Sabin, Director of Engineering, and his team evaluated the requirements of both areas and considered several options. The decision was ultimately made to install an innovative fabric air dispersion system – Low Throw Series DuctSox™ from Frommelt Safety Products.

#### **The Challenge:** *Precise, uniform cooling of vast work areas*

Danny Trent, Carolina Food Processors' utilities supervisor, recalls the problems related to the conventional air dispersion system, prior to the installation of DuctSox. "In our recent expansion, we added 14 new hog storage coolers, bringing the total number of coolers to 34. When you add that to the conversion area, where all the cutting is performed, you have a total area of about 100,000 square feet. That's a lot of space to cool efficiently and uniformly," he notes.

The sheer size of the work areas posed a major challenge, as did the plant's quality control requirements for precise, uniform temperatures throughout critical work areas. Optimum temperatures are 42°F in the cutting room and 34°F in the storage coolers. With conventional air handling systems, sharp streams of refrigerated air are blown from strategically-placed units, and temperature variations are common. These variations can diminish product quality by creating random pockets of fast-moving air that are either too cold, causing dehydration – or too hot, causing spoilage.

The velocity of the conditioned air stream adds to the problem. Frigid air flows moving



between 250 and 300 feet per minute (fpm) – typical in conventional systems – create a noticeable wind chill effect that contributes to worker discomfort and may lower productivity and throughput.

## **The Installation: Five miles of standard and custom Low Throw DuctSox**

According to Trent, a new cooling system was installed to accommodate the expansion in the ham boning room. In the hog coolers, the DuctSox were retrofitted to the existing refrigeration system.

Carolina Food Processors out-sourced the building addition and DuctSox installation to the Stellar Group, a Jacksonville, Florida general contractor specializing in new construction of cooling and refrigeration facilities.

When the installation was complete, more than five miles of Low Throw DuctSox were in place – about four miles in the hog cooler rooms and one mile in the ham boning room. This is Frommelt's largest DuctSox installation, to date, anywhere in the world.

In the hog coolers, a uniquely designed DuctSox system was installed. Considering the volume of pork and the volume of refrigerated air required to cool down carcass temperatures from 100°F to 40°F – cooling is typically a time-consuming process. In this installation, 68 fabric plenums, each 48" in diameter were installed in lieu of expensive stainless steel plenums. Offset from each fabric plenum are four or five DuctSox, each approximately 28" in diameter and 40' in length, made of a heavy-duty, low-porosity fabric.

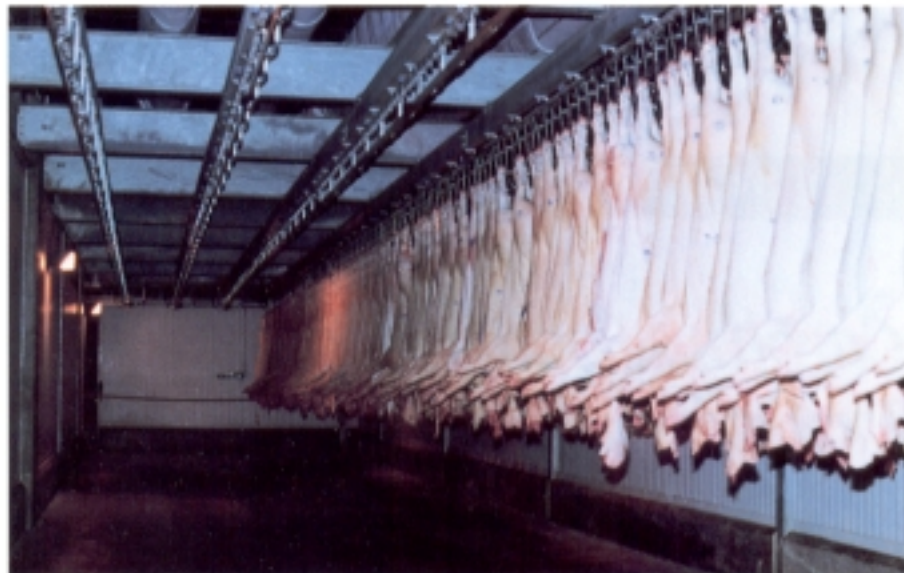
To distribute the air uniformly, more than 120,000 5/8-inch stainless steel grommets are inserted into the DuctSox on two-inch nominal centers, forming two rows, one on each side of the Sox. The grommets allow streams of refrigerated air to flow directly over the hog carcasses, which are hung from a conveyor below. With the new DuctSox system, cooldown is faster and more efficient, condensation and dehydration are eliminated, and the throughput rate to the conversion area has increased.

In the ham boning room, where worker comfort is a key concern, a total of 40 DuctSox were used. Each DuctSox is approximately 42" in diameter and varies from 86' to 116' in length. In this DuctSox application, the air is dispersed through the fabric without the aid of grommets, eliminating wind chill and turbulent air. Additionally, the air is uniformly distributed over the entire DuctSox surface area.

DuctSox are hung from suspended stainless steel cable attached between the discharge plenum and the opposing wall. The DuctSox are clipped on to the cable with plastic snaps that are sewn into the fabric, enabling easy installation and removal for laundering.

## **The Results: Faster, more efficient processing and increased production capability**

Since the DuctSox installation, overall processing time – from live hogs into prime cuts – has been reduced, increasing the plant's production capabilities significantly. And, thanks to DuctSox' gentle, uniform air dispersion, Trent and others in the plant have also noticed an improvement in the 400-employee work environment. "For one thing," he says, "temperatures are more consistent in both areas. We no longer hear complaints about cold



*Cooldown is faster and more efficient in the hog coolers due to a modified DuctSox system that allows streams of refrigerated air to flow directly over the conveyed hog carcasses.*

spots and drafts. Worker comfort has improved along with productivity."

Trent's observation is not surprising. DuctSox significantly reduce the wind chill factor because their permeable fabric releases conditioned air at a velocity of only 8 to 30 fpm. The air movement is so gentle as to be virtually undetectable, making production workers in refrigerated plants feel up to 15° or 20° warmer, even though the overall temperature remains the same.

As for temperature uniformity, DuctSox' performance is unmatched by any other air dispersion system. While tests have not been run at the Carolina Food Processors plant, tests run in a similar, 70,000-square-foot refrigerated plant using DuctSox revealed temperature variations of less than 1°F from wall to wall, ceiling to floor.

## **Additional Benefits: Secondary filtration improves air quality and plant cleanliness**

Trent also notes that one of the most appreciated benefits provided by the DuctSox, aside from comfort and temperature consistency, is their contribution to air quality and plant sanitation, which is especially noticeable in the ham boning room. In meat cutting operations, meat fibers and other debris can be borne aloft by air currents and carried into the air dispersion system, diminishing the quality of the air for both workers and products.

At Carolina Food Processors, air quality problems have been eliminated. "Cleanliness is a major concern in any food processing plant," Trent explains. "By acting as a back-up for our air filtration system, the DuctSox keep everything cleaner and create a better working environment in terms of air quality."

Other food processing plants have also discovered that DuctSox, because they filter the air as they diffuse it, provide an additional barrier against transmission of airborne dust, debris, and even microbes and bacteria. To maintain their filtration

effectiveness and cleanliness, the DuctSox in the ham boning room are taken down periodically and sent out for laundering. Carolina Processing invested in a spare set of DuctSox so a clean set is always available to be rotated in on a timely basis.

A relative newcomer to the Carolina Food Processors' Tar Heel plant, Richard Evans was not on-site when the DuctSox were installed. Today, as plant refrigeration supervisor, he is the person most involved in the day-to-day monitoring of the Sox' performance and is responsible for their maintenance. In addition, Evans works closely with the plant's QC team to ensure USDA/FDA requirements are consistently met.

Never having seen DuctSox before coming to Carolina Food Processors, Evans says he is impressed with their ease of maintenance and, especially, their performance. "The DuctSox system is so much quieter than the collection of fans used in many food processing plants to equalize air distribution," he notes. "In my opinion, DuctSox are a great invention – an ideal way to go whether you're cooling a meat processing operation like ours, or a bakery or anything else. It's hard to believe that something as simple as fabric tube DuctSox could make such a difference – but they do."

Carolina Food Processors has long enjoyed its well-earned position as a market leader. Today, the state-of-the-art Tar Heel plant is not only one of the world's largest, but has gained the ability to deliver its top quality pork to global markets faster than ever before.

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