

Filtration Systems Help Meat Packer Maintain High Quality and Save Money

The installation of a filtration system and a nitrogen generator system is helping Fresh Mark Inc., an Ohio meat producer, improve its already high quality standards while saving about \$20,000 per month. One of the filtration systems removes moisture, particles and microbes from the company's air compressors in order to maintain a sterile production environment. The other converts air into nearly pure nitrogen that is then injected into packages to eliminate oxygen that could cause premature spoilage. The compressed air filtration system has helped the company make further improvements in the already very high cleanliness of its production machinery. The cost savings come from the elimination of the need to purchase nitrogen in cylinders and from the near elimination of maintenance of both devices, which have no moving parts and only require changing over filters every three to six months. "The filters work great and we have seen a significant reduction in our microbe count, which was already well below acceptable levels, since we have installed them," said Jerry Rowan, lead maintenance technician for Fresh Mark, Massillon, Ohio.

The Fresh Mark product line includes bacon, hams, deli meats, wieners, smoked sausage, and deli products provided to the retail and food service industries by the company's Sugardale Foods and Superior's Brand Meats divisions. Food safety is an integral part of the company's manufacturing process. Teams of scientists and specialists work every day with leading edge technologies to guarantee that food products are manufactured under the safest possible conditions. Nothing is worn by employees that could introduce bacteria into the manufacturing process. Advanced information systems enable fast communications among the teams responsible for food safety. Finally, Fresh Mark's manufacturing facilities work hand in hand with the United States Department of Agriculture to meet or exceed food safety standards.

Improving on an already great quality record

The people that safeguard quality at the company are focused on continuous improvement. One of these improvements involved the packaging machinery powered by compressed air that is used to stack and wrap bacon. This machine is tested for bacterial growth on a regular basis by wiping it with swabs and testing the material that is collected. Even though the machine consistently passed tests designed to check for bacteria, engineers were concerned that small impurities in the air could promote bacteria growth. They felt that that one way to address this concern would be to ensure that the air used to operate the machine was free of moisture and foreign particles.

They looked at a number of different alternatives and selected a Balston sterile air filter assembly which includes three separate filters that address every aspect of providing clean, dry and sterile air for food industry applications. In particular, Balston's sterile air filters remove more than 99.99% of 0.01 micron particles and 100% of all visible particles and have been USDA accepted for use in federally inspected meat and poultry plants. A Balston sterile air filter assembly, consisting of A912A-DX, A912A-BX and A912A-SA filters was tested at the University of Massachusetts. The filtration system produced commercially sterile air and within the limits of detection, no viable colonies of microorganisms were found. "Even though we were well under the limits before, when we installed the new filters, we saw a reduction in our already low microbe counts," Rowan. "The only maintenance they require is changing the filter cartridges every three months."

Saving money by generating nitrogen

Rowan was so impressed with how well the filters worked that he suggested using the filtration concept to address another quality-related issue. Oxygen in the air hastens both the chemical breakdown and microbial spoilage of many foods. To help preserve foods longer, scientists have developed ways to help overcome the effects of oxygen. Modified atmosphere packaging helps to preserve foods by replacing some or all of the oxygen in the air inside the package with other gases such as carbon dioxide or nitrogen.

Replacing air with nitrogen inside the package can typically increase shelf life of cooked meats from 7 to 28 days.

In the past, Fresh Mark used nitrogen cylinders to provide gas to its packaging machine. The problem with this approach was that it was costly and time-consuming. Management was also concerned with the safety of handling large, heavy canisters filled with highly compressed gas.

How nitrogen generators work

Rowan heard of filters that separated nitrogen from air, making it possible to produce the gas at almost no cost. After having such good luck with Balston sterile filter assemblies, he recommended Balston membrane nitrogen generators which use membrane separation technology to produce a continuous supply of nitrogen gas without requiring any moving parts. The generator separates air into its component gases by passing inexpensive, conventional compressed air through bundles of individual hollow fiber, semi-permeable membranes. Each fiber has a perfectly circular cross-section and a uniform bore through its center. Because the fibers are so small, a great many can be packed into a limited space, providing an extremely large membrane surface area.

Two stages of coalescing prefiltration are incorporated into the Balston 75-7820 nitrogen generator to protect the membrane module from contamination. These filters are located behind the filtration access panel, and they remove liquids and particulate matter from the incoming air supply. The filters are equipped with float drains that automatically open to empty any accumulated liquid inside the filter housing. The drains are connected to ¼" O.D. plastic tubing which discharges to atmosphere at the back of the nitrogen generator.

Air separation takes place in the membrane module. The module consists of bundles of hollow fiber membranes. The inlet air enters the center bore of these fibers and travels the length of the fibers. As the air passes through these hollow fibers, oxygen and water molecules pass through the membrane at a higher rate than nitrogen molecules. This results in producing very dry,

high purity grade nitrogen gas exiting the membrane module. The oxygen enriched permeate stream exits the membrane module through ports on the side of the module at very low pressure.

The final filter, a 0.01 micron absolute membrane filter, provides clean, commercially sterile supply of high purity nitrogen. The controls on the nitrogen generator consist of an operating pressure gauge, a flowmeter and flow control valve, an outlet pressure regulator and final gauge. Proper use of these controls assures the user of a 99% to 99.5% pure nitrogen outlet stream, depending on operating pressure and flow rate. The pressure gauges, which are mounted on the front panel, measure operating pressure and outlet pressure. The flowmeter measures the flow rate of nitrogen exiting the membrane module.

Cost savings plus minimal maintenance

The generator requires virtually no attention because it uses simple electromechanical components such as pressure vessels, and valves with a history of reliability in laboratory applications. A key factor in the increased reliability provided by the generator is its elimination of the logistics of the gas supply chain. Since the nitrogen generator simply separates air into its constituent parts, it has no adverse environmental effects. Both the nitrogen produced by the unit and the oxygen mixture generated as a byproduct can be released into the atmosphere. Gas generators are also much safer than high-pressure cylinders. The generator typically operates at a low pressure in the neighborhood of 100 psig and stores small volumes of compressed gas. The stored volume is much less than 1 cubic foot, compared to about 200 cubic feet stored in a typical high-pressure gas dewar. Gas generators also eliminate the need to handle cylinders, which presents a risk of injury caused by dropping, lifting, or asphyxiation.

At current production levels, Fresh Mark has achieved significant cost savings with the nitrogen generator “The nitrogen generator saves us a lot of time and money, yet requires almost no attention,” Rowan said. “In the time that we have had it, we have only had to change the filters and never paid any other attention to it.”

For additional information on Balston® products, contact Parker Hannifin Corporation, Industrial Gas Filtration and Generation Division, 4087 Walden Ave., Lancaster, NY 14086. Tel: 716-686-6400 Fax: 877-857-3800 Web site: www.parker.com/igfg

FreshMark1-2: Fresh Mark's product line includes bacon, hams, deli meats, wieners, smoked sausage, and deli products.

FreshMark3: Fresh Mark's Sugardale Foods and Superior's Brand Meats divisions provide the company's product lines to the retail and food service industries.