

Don't Bring Contaminants Along for the Ride

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In the world of food processing the pressure is on to get the tastiest, most eye-appealing yet safest possible product through the system and out the door in the shortest possible time.

The battle to minimize food contamination is fought on multiple fronts — in the air by controlling the airflow that can transport these microbes by way of the HVAC system, and on the ground at the various doorways as food travels from room to room on its way to the shipping dock.

When it comes to the HVAC the pressure balance is tricky and crucial. While clean processing areas are routinely kept at a positive pressure, one of the keys to contamination control is creating a negative-pressure environment in the first stage processing areas. Effectively avoiding contaminant migration through maintenance and facility design — including air-handling systems and doors that connect process areas — presents an ongoing challenge that all plants face in providing a safe processing environment.

One of the worst-case scenarios is finding a way to maintain that negative-pressure condition in risk-prone areas in poultry processing, where receiving, shackling and evisceration takes place. Picture 20,000 frantic birds entering the process each day amidst the flurry of high-pressure water sprays and rotating picking equipment.

It's easy to see where the problem starts, especially for ready-to-eat product.

Poultry is the most dramatic example, but contamination control is just as challenging for other meats and raw product that gets cut up and washed down in the initial stages. Preventing this dirty, moisture-laden air from entering the clean portions of the plant is critical.

Though so much attention is focused on the cleanliness of tools, tables and processing equipment — and rightfully so — airborne pathogens can't be ignored. Fortunately, the negative pressures, created by large exhaust fans (12,000 to 50,000 cfm) in these areas remove most of the bioaerosols before they have a chance to contaminate product as it's processed and packaged.

However, once leaving these areas where the product is last exposed to open air, product enters the air pressure zone with the highest positive pressure. Along with the kill step, this area is the site for any product involving trimming and washing that must be maintained as a positive pressure, highly filtered air zone.

When all ventilation systems are working as designed and the pressure differentials are balanced, fresh air will flow from hygienic, pressurized cutting, trimming and packaging operations to exhaust fans in areas where bioaerosol emissions need to

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be contained. Waiting and ready are dozens of variables that can disrupt this flow and allow the airborne contaminants (potentially including *Listeria Monocytogenes*, *Escherichia Coli* and *Salmonella*) to find their way out into the plant. Even "fresh air" intakes, located too close to the receiving areas can introduce humidity, molds, bacteria and bioaerosols as well as fertilizers and herbicides from any nearby fields.

Facility and system improvements

The selection of construction materials and components for clean rooms and processing areas is critical. If owners do not pay proper attention they may unknowingly build sources of contamination into their own facilities. Maintenance plays a vital role in keeping a proper balance of pressure and airflow as dirty or defective fans can also disrupt the original airflow and pressurization design scheme.

Here's where doors come into consideration. Any holes, vents, leaks or openings in interior or exterior walls will create problems as well. When you consider the amount of worker and product movement, at docks and between processing rooms along with the size of the doorways, it's also easy to see the role that doors (especially those that open to the outside) play in maintaining proper pressures and clean environments.

Outside air infiltration

Without a doubt common, overhead, perimeter doors frequently leak (500 cfm per exterior door is typical) due to sealing deficiencies, internal pressurization and wind. And, when they're left open too long from slow operation, the inward flow capacities can permit air infiltration of 18,000 cfm — or more, depending upon internal pressurization, wind direction and velocity.

Some facilities use either slow, overhead "garage doors" or sliding doors that frequently leak air. Other facilities attempt to cover their doorways with strip curtains to speed traffic. Along with enabling a fairly high level of air infiltration, strip curtains make contact with food.

Manufacturers offer a variety of high-speed doors that minimize potential air infiltration time, yet close securely to minimize air infiltration at all four sections of the perimeter. In addition, advancements in electronic controls have made these doors more responsive and not only requiring less maintenance, but are also easier to maintain.

Quick door opening time and full perimeter sealing help prevent air infiltration caused by winds or internal pressures. High-speed doors are an economical yet effective alternative to other more advanced and expensive contamination control methods. Most importantly, these doors keep your product moving along.

Cross contamination reduction

High-speed door activation is an advantage for both outside and inside applications.

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Not only do shorter "open times" speed transportation of product between processing areas, they also help maintain the proper pressurization of each area thanks to minimal time they are open. It's totally logical that faster door speeds will limit the migration of airborne contaminants and ultimately play an important role in protecting food quality and safety.

In the processing/packaging areas, where hygiene is most critical, you should look for doors with stainless steel components and fully washdown surfaces. Other standard features that are essential in this environment include a stainless steel run-off trough to prevent accumulation of water and bacteria as well as a severe-duty, food-grade washdown motor with USDA-grade oil.

Monitor plant air quality. Talk to the specialists.

Since plant designs, as well as their internal and external operating environments are subject to constant change, it's important to make routine air sampling (of all preparation and processing areas) a standard component of your HACCP program. Plant management should also work with professional engineers to optimize HVAC systems while enforcing air handling equipment maintenance and operating procedures, and with their local door dealer to find the best doorway solution.

Keith R. Schmitz is a writer with [Rytec High Performance Doors](#) [1].

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[1] <http://www.rytecddoors.com>