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Sterile-Aire UVC devices reduce mold in cold and moving air environments.

Spurning Spores

BY ROBERT SCHEIR, PHD

THE STORY IS FAMILIAR: A FOOD PROCESSOR BATTLES mold, product quality is inconsistent and shelf life, reduced. Rigorous cleaning of lines, sprockets and other components provides brief respite, but the problem returns.

Ultraviolet-C (UVC) energy can eradicate surface and airborne contamination. One form of electromagnetic energy produced naturally by the sun, the UVC wavelength targets DNA of mold, bacteria and viruses, kills cells or makes replication impossible. Because these microorganisms are so small, germicidal energy readily penetrates their DNA; UVC is not especially effective on the larger organisms.

The UVC Emitter™—basically a bulb and fixture manufactured by Cerritos, CA-based Sterile-Aire™—outputs energy in cold and moving air environments such as processing lines and air conditioning (AC) systems. The UVC energy continuously cleans the source of trouble—the mechanical equipment in the plant—without chemicals or heat and does not produce ozone or other secondary contaminants. The cool, dark, moist environment of AC coils, for example, provides a breeding ground for mold; spores of *Penicillium, Aspergillus, Cladosporium* and *Alternaria* can multiply and become concentrated.

Using AC to cool baked goods means product can leave the oven free of microorganisms and become contaminated before leaving the plant. Pressure washing is ineffective and pushes mold deeper into rows of the coil; other coil-cleaning procedures can involve harmful chemicals.

Properly installed UVC devices, however, emit germicidal energy that reflects off the coil fins and works through multiple rows. The coil is restored to as-new condition within a few days to a few weeks. As they continue to operate, the lights provide ongoing protection from mold and organic buildup and destroy airborne bacteria and viruses circulated by the AC system.

Better Butternut

Weekly product sampling and periodic air and surface monitoring are part of the HACCP plan at John B. Martin & Sons Farms Inc., a produce grower and packer in Brockport, NY. Yeast occurs naturally in butternut squash, but Production Manager Peter Martin knew he could improve yeast and mold counts in the product and air. The room in which the squash is peeled, seeded, cubed and tray wrapped for retail distribution had yeast and mold spore levels of >20,000 CFUs/m³ of air. He suspected cross contamination from the area where raw cabbage was stored on the other side of the building.

Learning of a University of Tulsa (OK) study that concluded UVC Emitters reduced mold contamination in a 286,000-sq.-ft. facility by 99%, prompted Martin to give the technology a try. His 800-sq.-ft. room was fitted with a makeup air unit that pressurizes the space and two UVC light fixtures. The solution, Martin says, was "surprisingly simple." Installation during the off season in just a few days, did not interrupt production.

The lights last approximately 16 months—two seasons—and the air sampling shows a tenfold reduction in CFUs. Before HACCP implementation, the shelflife of the butternut squash was less than a week; HACCP added about three days. Pressurizing the room and installing lights increased shelflife to two weeks, which has marketing implications: The company can ship to further destinations. UVC lights, sound management practices, a well-implemented HACCP program and good post-processing refrigeration are among the factors contributing to three generations of successful Martin farming.

Plants without AC or refrigeration can install UVC devices over production lines. Here the lights address surface contamination from *Listeria, E.Coli, Staphylococcus* and *Salmonella.*

Another promising application for UVC is to control incoming contamination. Raw materials brought into the plant are treated in "tumbling" machines—very much like clothes dryers—equipped with UVC lights. The machines use either a rotating drum or a screw conveyor that lifts and tumbles the product to ensure exposure of all surfaces to the germicidal UVC energy. Custom-designed to suit each application, the tumbling action can be extremely gentle to accommodate ingredients such as fruit, or more vigorous if used with potatoes.

With the proper safeguards, UVC energy is relatively harmless to humans. OSHA guidelines state workers should not be exposed directly; on a production line, tunnel-type configurations provide sufficient shielding effect.

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