#### SAFETY & SANITATION ULTRAVIOLET LIGHT



# **Give UVC a Tumble to Eliminate Bacteria**

System uses germicidal tumbling drum | BY ROBERT SCHEIR, PhD

eeping coliform bacteria counts below required thresholds is a challenge for food processors everywhere, and Washington Potato Co. (Warden, Wash.) understands. "Though we were generally successful in controlling coliform bacteria levels on our products, the time and costs required to achieve control were excessive," said Nicholas D. Ross, quality assurance and technical services director for the potato processing company.

Washington Potato is an industrial supplier of dry and frozen potato products that are remanufactured by other processors into products such as snacks, soups, stews, and mashed potatoes. One popular Washington Potato product is an IQF (individually quick frozen) diced potato that is minimally blanched prior to freezing. The product sporadically showed initial coliform bacteria counts that were not acceptable to Washington Potato and its customers.

"In efforts to control the problem, we had to treat product transport systems continuously with allowable sanitation chemicals and shut down the process line for major cleaning," Ross said. "Sometimes we held product in frozen storage to reduce counts and/or sold the held product to customers with less stringent requirements, for example, for animal feed applications. Though this strategy was effective from a product safety standpoint, it was not efficient or economical."

# **Giving UVC a Tumble**

While searching for solutions at a regional food processing show, Ross learned of a new technology from Reyco Systems Inc. (Meridian, Idaho) that harnessed the germicidal effects of UVC light (ultraviolet light in the C band wavelength) installed in custom-designed tumbling drums for decontamination of food surfaces. Used for many decades for surface and air disinfection and water purification, UVC is scientifically proven to disrupt the DNA or RNA structure of bacteria, viruses, molds and fungi, and yeast. UVC will kill the gamut of microbial contaminants, whether naturally occurring or the result of bio-tam-

pering, including *Listeria*, *Escherichia coli*, *Salmonella*, *Staphylococcus*, and other microorganisms.

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UVC is safe to use, leaves no surface residue, and will not chemically alter food products. Unfortunately, conventional-style UVC devices like those in use for the last several decades lose much of their germicidal effectiveness—or killing power—when operating in cold or moving air conditions, such as those encountered in the processing of refrigerated and frozen foods.

To overcome this limitation, Reyco uses the UVC Emitter<sup>™</sup>, a new-generation device designed and manufactured by Steril-Aire Inc. (Burbank, Calif.) to deliver high-output germicidal energy at low temperatures without loss of efficacy. In multiple studies, the UVC Emitter has been shown to eliminate 99.9% of microbial contaminants on the surface of food products. The United States Department of Agriculture and the Food and Drug Administration have approved UVC for surface decontamination, with no labeling required.

Steril-Aire has marketed the devices since the mid-1990s for mold and microbial control. In addition to their application in the food industry, they are widely used in HVAC systems in hospitals, laboratories, schools, and commercial and government buildings to improve indoor air quality, save energy, reduce coil-cleaning costs, and control infection.

Reyco has licensed a patent-pending methodology incorporating these devices into a tumbling drum that ensures maximum UVC exposure to all surfaces of the product.

Small, portable machines are available to prospective customers for on-site demonstration and testing. "Test results from one of these portable units convinced us that the system worked, and we made the commitment to purchase a permanent tumbling drum for our processing line," Ross said.

# **Custom-Designed Drum**

The machine designed and installed by Reyco uses a customized tumbling drum that can process about 14,000 pounds of product per hour, easily handling Washington Potato's requirements, with capacity to spare. Inside the drum are 32 single-ended UVC Emitter tubes in two fixtures designed to withstand wash-down with water and cleaning chemicals. The UVC lights shine continuously to bathe the diced potatoes in germicidal light as the drum gently lifts and rolls the product to make sure all surfaces are decontaminated. The light tubes are wrapped in shatter-resistant plastic sheathing as a safeguard in the unlikely event of tube breakage.

Installation took place in February 2007 in conjunction with a general remodeling of the packaging line, allowing Washington Potato to adjust the layout of the line to accommodate the new UVC tumbling drum. The potato dice comes out of the freeze tunnels, passes an electronic defect remover and metal detector, and is then conveyed into the drum for germicidal treatment just prior to packaging into 1,400-pound totes or 40-pound poly-lined cases.

After initial installation, Reyco and Washington Potato went through a test period to work out the best retention times and operating conditions. "We were able to enhance 'kill' rates by adjusting the speed and angle of the drum and the amount of time spent tumbling each type of product," said Brian Scott, sales and marketing manager at Reyco.

The production line operates 24/7, with a weekly shift-down for re-sanitizing of the entire line, including the tumbling drum. The UVC Emitter tubes were replaced, as recommended by the manufacturer, after approximately one year of service. In addition to the IQF diced product, Washington Potato uses the UVC drum for added protection on all products that go through the line, including partially dried and roasted potato pieces. No adjustments to the drum are needed to accommodate the different products.

#### **Results, Savings Documented**

Washington Potato reports numerous benefits since adopting the technology. "We have eliminated any coliform bacteria on the line, a fact confirmed by microbiological tests that we conduct on samples from every shift," said Ross. "Basically, the quantity of product held for microbiological reasons has been reduced to zero. As an added benefit, total plate counts, which measure any type of bacteria that will grow aerobically, have been reduced tenfold since we started using the UVC drum," he added.

"As an interesting side note," he said, "shortly after initial installation, we took the drum out of service for modifications. During that period, we quickly saw a sporadic reappearance of coliform bacteria and an increase in total plate counts, occurrences that disappeared as soon as we reinstated the UVC drum on the line. This provided further proof that it is doing its required germicidal job."

Ross added that the amount of money saved was "significant," because they eliminated the many costs resulting from held or rejected product. "We have also eliminated the related worries associated with potential customer dissatisfaction, loss of business, or even liability. With the UVC providing continuous microbial control, we have the confidence that all product going through the line comes out clean."

### **Approved for Organic Processing**

Washington Potato has recently received approval from the Washington State Department of Agriculture to use UVC for decontamination of organic products. "We are using UVC on an increasing basis for organic processing of our own private-label stock items and those manufactured on a contract basis for other processors, wherever approved by the customer," Ross said.

Reyco's Scott said his company's UVC decontamination drums can be used on a wide range of raw, cooked, or frozen food products prior to incoming storage, processing, or packaging. "Products that can benefit from treatment with UVC include meats, poultry, seafood, vegetables, fruits, dairy products, and nuts," he added. "Proven benefits include increased product yield and safety, longer product shelf life, and the ability to reduce or eliminate the use of chemicals and/or preservatives."

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