

HVAC & PLUMBING PRODUCT NEWS

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Clean it Up



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Top of the Crop

Mushroom farm cuts costs with UV light systems

At J-M Farms, Miami, Oklahoma, producer of 27 million pounds of produce annually, HVAC maintenance and energy costs for dozens of mushroom growing quarters were escalating exponentially and cutting into profits.

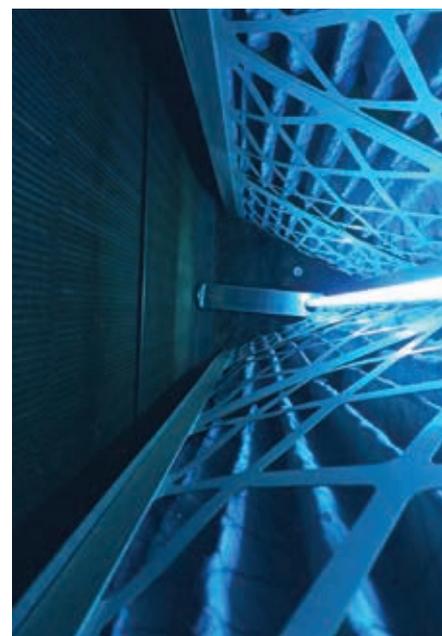
J-M Farms is a wooden tray operation in which final growing and harvesting phases occur inside unique satellite Quonset huts.

Mushrooms thrive in 85 percent (± 2 -percent) relative humidity and cool 59-64 F temperatures. Unfortunately, so do undesirable mold varieties when harbored in an air conditioner's dark spaces and nourished by a perpetual supply of condensed humidity during 24/7 operation. "All mushroom farmers experience similar HVAC coil mold challenges," said Scott Engelbrecht, J-M Farms' growing operations manager.

Hospitals, schools and other commercial buildings have installed ultraviolet germicidal irradiation in HVAC systems for years to keep coils clean of microbial growths for both maintenance and indoor air quality reasons, but the technology is new to mushroom farms, according to Engelbrecht. Like many newcomers to UVGI, Engelbrecht was somewhat skeptical, therefore he took advantage of a free UV trial demonstration program offered by air purification manufacturer, Fresh-Aire UV. The program offers building owners a free UV installation and 90-day performance analysis conducted by a certified HVAC service technician. The facility owner can choose to purchase the equipment or have it uninstalled at no cost.

The free installation included Fresh-Aire UV's Tubular Rack UV System mounted to a recently cleaned air-conditioning coil. It featured a 60-inch long 254-nanometer UV lamp with a Teflon coating that minimizes breakage and contains shattered glass and lamp gases if accidentally broken. The power supply and ballast carries a lifetime guarantee. The only maintenance required is a quick lamp replacement every two years to guarantee optimum performance.

The trial coil showed no signs of the black, brown and slimy mold that



Clockwise from top: Hospitals, schools and other commercial buildings have installed ultraviolet germicidal irradiation in HVAC systems for years, but the technology is fairly new to mushroom farms. > Quonset huts feature Fresh-Aire UV's Tubular Rack UV System mounted to a recently cleaned air-conditioning coil. > The Quonset hut air handlers at J-M Farms are each supplied typically by two 80 ton Carrier chillers. J-M Farms' staff has also built some of its own air handlers to handle the heavy cooling and humidity load demands of mushroom farming.

typically coats coils after three months of 24/7 operation. Now Engelbrecht is rolling out the UV light retrofit of 42 remaining Quonset hut air handlers assisted by in-house technicians trained by Fresh-Aire UV to install systems and replace lamps. Engelbrecht expects a payback of less than one year on each UV light system when considering the reduced maintenance costs and the HVAC units' extended lifecycles due to less cleaning.

Before installing UV light systems, J-M Farms' satellite operations was hiring local HVAC contractor, Service Solutions Inc., for quarterly in-unit cleanings. While expensive, the coil cleaning was critical to improving static pressure by 15-20 percent, which was proven with post-cleaning airflow tests using an anemometer.

Additionally, Service Solutions and J-M Farms' in-house maintenance staff has had to recondition all the

operation's HVAC coils. This process requires removing a dirty coil, replacing it with a spare coil and then deep cleaning by submerging it in a chemical solution for two days. The clean coil is then reinstalled to replace another dirty coil, which starts the process again. The staff also streamlined the reconditioning process by customizing the air handlers with coil isolation valves and flange fittings. As if coil maintenance costs weren't enough, costs to replace units prematurely corroded from frequent exposure to cleaning chemicals were approximately \$5,000 each.

In comparison, UV light systems offer benefits beyond coil cleaning, such as killing airborne mold spores related to diseases that affect mushrooms and reduce harvest outputs. "What mushroom farmers grow is technically a type of mold," said Engelbrecht. "So our environments can potentially create undesirable competing mold or mold-generated diseases that affect the mushroom crop."

Conventional particulate media filters can entrap mold spores, yet they continue to live and reproduce within the system. UV light systems, however, provide chemical-free disinfection that scrambles the microbe's DNA so it can't reproduce. Not all UV light is the same. UV-A (used for black lights), UV-B (used in tanning salons and causes sunburns) and UV-C wavelengths are all present in sunlight. However, higher frequency UV-C wavelengths are filtered by the earth's upper atmosphere, therefore microorganisms, such as mold, have no experience or defense against it. UV-C light is strong enough to sterilize microbes, but not enough to degrade an HVAC system's coil or interior surfaces.

For Engelbrecht, his UVGI discovery represents a chemical-free, maintenance-free cleaning process that doesn't degrade coils and provides an optimal energy-saving efficiency.

"I don't know why the mushroom industry hasn't discovered this previously, but they should certainly know about it," said Engelbrecht. **CHECK OR CIRCLE #100**