RESTAURANT FACILITY BUSINESS

Exploring UV Technology

UV technology — a light at the end of the duct?

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The recent popularity of UV hood systems has created a stir in the exhaust service industry. Manufacturers are pushing these units as the "Cadillac" of exhaust systems, touting them as "virtually maintenance-free," and as being the ultimate answer to how to deal with grease exhaust. I have heard numerous rumors and rumblings from International Kitchen Exhaust Cleaning Association (IKECA) members, including one story from an IKECA member whose municipality allegedly attempted to mandate the use of UV systems for all new hood system installations.

Many questions have been raised by my peers, my clients and myself: "Is this safe? Does it work? What does this mean for the future of exhaust cleaning?" As I began to work with these systems, I discovered quickly that there are more questions than answers.

The concept of the UV system seems simple enough: Exhaust vapor passes through an efficient primary filter, and is then slowed and separated by a secondary filter (particulate separator), at which point effluent vapors come into contact with the UV light which breaks the particles down. A side effect of this process is the production of ozone, which then travels the duct and has a theoretical cleansing effect on any grease that may have slipped past these high-tech grease grabbers.

On the surface this seems like a facility manager's dream come true. No more grease, no more risk of grease duct fires, and no maintenance… right?

Are UV hood systems really the "Cadillac" of exhaust systems?

Not exactly.

In my experience, UV exhaust systems are more costly to maintain and their expense leads to unwillingness on the part of the end user to facilitate proper maintenance. This situation creates a greater potential for disaster than the alleged benefits of UV technology justify. The expensive and labor-intensive process of maintaining the components of a UV system increase the likelihood that a non-functioning UV system will be ignored by the end user. This allows flammable residue to collect in the exhaust system, thereby increasing the risk of a fire in the facility while making repairs more costly and time-consuming.

Unfortunately, there is not an adequate set of safety controls in place to compel the end user to properly maintain the UV system. When a component of the UV system fails, a small light goes on to indicate the unit is in need of service. The gas does not shut off to the cook line, the exhaust fan continues to run, grease-laden vapors continue to pass through the system and exit the facility, and the cooks have no reason to cease cooking operations. Chances are that the cooks are completely unaware that their system has ceased functioning and is now loading the ductwork with flammable effluent residue. There is nothing to compel the facility to repair the system; the functioning of the UV system is thus invisible to the end user.

Consequently, a false sense of security is created for the end user who has purchased the concept that they no longer have a fire risk in their exhaust system. Because financial savings (via the reduced need for exhaust cleaning, for example) is touted as a major benefit to these systems, there is often no room in the maintenance budget for the service calls to diagnose and repair the system components, nor to clean the accumulated flammable residue from the system when a system failure creates the need for cleaning.

Who can blame the end users? They purchased a unit that was purported to make their grease problems

go away with the flick of a light switch. The investment in this system was assumed to be on the pre-opening side. Recently I was attending a meeting during which a manufacturer's representative described what happens to grease with the UV system. His answer was simply,

"The grease goes *poof*…and it's *gone*!"

Facility managers pay a very expensive premium for this product, and in many cases, they are simply not prepared for the reality of the maintenance required. In fact, in most instances when I visit a client with a UV system, I find that they were not aware of the maintenance requirements.

Details such as the daily requirement for the cleaning of the components of the UV system are often hidden away in a manual that the end user may never see, let alone review. For the purpose of this article, I will quote from the requirements for maintenance directly from the manual of a popular UV hood manufacturer:

"At the end of the cooking day the exhaust fan is turned off at the [name brand removed] control. After the fan has been turned off, the extractor inserts and particulate separators are removed and can be washed either in a dishwasher or soaked and rinsed off…. The UV lamps will develop a coating of dust. This coating must be removed for optimum performance. Therefore, once a week while the cartridges are removed, inspect the lamps and clean as needed."

I encourage you to read this passage twice, perhaps even three times. My experience is that this quick little blurb from an over 30-page manual will come back to haunt your client. Chances are that you will be the messenger, a position that I have been in many times. I often worry that I will need a flak jacket when showing this requirement to the system owners. Allow me to translate this passage for clarity:

Every day, the large bulky solid metal extractor boxes must be removed from above the cook line and cleaned. Every day, the row of particulate separators must be removed from the hood sections and cleaned. Every day following cleaning, these items need to be properly replaced. Failure to replace them properly will result in failure of the UV system, or the potential of the extractor units falling from the hood onto the cook line (read cook) below. Each week, UV cartridges must be disconnected from the electrical controls, removed without breaking the bulbs, wiped down carefully, again taking care not to break the bulbs or reduce their life, and finally replaced into the hood system and rewired.

Let's do some basic math on the internal maintenance that a hypothetical restaurant would need to perform. For the sake of this example, let's say the restaurant in question has 25 extractors, 25 particulate separators and five UV cartridges. This is roughly the equivalent of a traditional hood (or set of hoods) with 25 filters. If it takes an average of 2 minutes to remove each part, 5 minutes to wash them, and another 2 minutes apiece to put them back, a kitchen worker (alone) would need approximately 7 hours to perform this job every single operating day!

Most kitchen workers are not accustomed to the hazards of working over equipment such as deep fryers and flame broilers in order to remove and replace heavy metal extractors and fragile mesh-based particulate separators. A facility using this equipment is going to need some comprehensive supplementary safety training.

According to the manufacturer's guide for weekly maintenance, the UV cartridges are required to be removed, inspected and cleaned. The process of removing a UV cartridge is not a single-person job. At least two individuals must balance the cartridge and bring it carefully out of the hood system, and place it in an area where it will not be damaged during cleaning, nor broken during transport. In my experience, it takes a minimum of 5 minutes to disconnect and remove a UV cartridge, and often a lot longer than that. Wiping the bulbs and inspecting them is no problem, if the person knows what he or she is looking for and knows what to use when cleaning the bulbs to prevent damage. Allow another 5 minutes for this process. Replacing the cartridge is awkward and somewhat difficult. Once the cartridge is in place, it must be plugged back in, which often requires work out of sight and at difficult angles above the cooking equipment. Assuming the kitchen workers can handle this task, let's allow another 10 minutes per cartridge to replace and rewire them. In our example kitchen with five cartridges, this process adds another 3 service hours weekly divided between two competent kitchen workers.

Assuming the kitchen workers follow the manufacturer's instructions and everything goes efficiently and perfectly every day, they don't break any bulbs, and they wire everything into place properly, the annual maintenance cost for this seemingly innocuous passage in the service manual is 2,893.5 hours for a 365-day operation. Assuming that this maintenance is trusted to a kitchen worker earning $6 an hour, the expense is $17,361 in payroll.

But wait! These allegedly "low maintenance" units have a few other minor details still needing to be addressed (read: purchased and paid for). After 8,000 operating hours, the bulbs must be replaced. If the restaurant leaves the system operating 24/7, the bulbs will last about a year (again, assuming no breakage). Factor in that there are an average of five bulbs in each cartridge (different manufacturers have different designs, and each with proprietary bulbs). Our example restaurant had five UV cartridges, therefore 25 bulbs. The listed price from the manufacturer (without shipping) of the bulb based on length is $88 or $128, plus two grommets per bulb at $5 each. Thus, the average cost is $108 per bulb (without labor to replace nor costs for the disposal of

the used bulbs), and we have arrived at a cost of replacement (parts alone) for this kitchen at $2,700 annually. Our hypothetical restaurant has committed to over $20,000 in recurring annual maintenance costs — but again, this cost is assuming that nothing has gone wrong or been broken.

What could possibly go wrong? This is a "Cadillac," right?

Each UV bulb is linked to a $100 ballast. The ballasts will go bad; it is only a matter of time. These require replacement, and high heat — such as certain appliances or cooking styles under the hood — can speed the life of the ballast along to the point where they may need to be replaced quarterly. In one case I have seen ballasts go bad as quickly as 1 week. Let's not be hasty though... Assuming that a ballast can last 1 year, that amounts to an additional $2,500 in parts cost. Pressure switches, gaskets and other parts that will wear out over time range from $125 to $450 list price.

All these factors together, this restaurant will need to have room in its budget for at least $25,000 annually to maintain this system. After all of these routine expenses, this restaurant still has not had its hoods, ducts and fans cleaned once!

In the relatively short time that UV exhaust systems have been installed in my area, I have already had one client determine that it was more cost-effective to demolish their existing UV hood system in favor of a more traditional system. Another client requested that their UV systems be disabled and gutted. A third client has successfully petitioned the local fire department to dismantle the UV elements of their hoods and service them as traditional systems.

Once the end users are faced with the reality of the costs of upkeep on these systems, they are not the happy bunch of "Cadillac" owners you might have expected. It is only the most financially successful businesses that continue to keep the systems maintained as required, and even they resent the high costs associated with UV system maintenance.

The most successful UV installations I have encountered are those that have established an internal maintenance program combined with a monthly service plan (inspection and routine maintenance). This properly maintained system was able to reduce the amount of grease in the duct, though the hazard of a grease duct fire was not entirely eliminated. On a recent large-scale UV installation I proposed this type of monthly maintenance package to the end user. The management of this facility was confused about their maintenance needs, and contacted the manufacturer. The manufacturer's representative came to the facility and told the end user, and I quote: "Why would you need a maintenance plan? You bought the Cadillac of exhaust systems!" RFB

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