

(Image courtesy
Purex Fume Ex-
traction by BSE)

Clearing the Air

CHOOSING AND INSTALLING A FUME EXTRACTOR

BY MIKE CLARK

Running a shop with the newest and latest equipment can help a business stay ahead of the competition. However, making sure working conditions are both safe and comfortable is also crucial. This is especially true for producers working in markets like laser engraving, sublimation, and wide-format printing.

These heavy-duty machines emit fumes and byproducts that can at best make a work area uncomfortable and at worst, unhealthy or even dangerous. Quite often, these elements aren't visible to the human eye, either. "With these processes, you have extremely fine particulates being produced," says Wayne Baird, PAT Technology Systems. "Ninety percent of those particulates, whether it's plastic, glass, paper, or leathers, are 1 micron or less in size."

In addition to employee safety, Brian Tefertiller, BOFA, stresses that mitigating these fumes and particulates also helps

maintain machine life. "Fumes and particulates released into the air by the laser cutting/engraving process can be damaging to the optics and other sensitive components of the equipment."

To help alleviate some of these issues, shops can install a fume extractor to help minimize the number of byproducts generated by these processes. Although venting may seem like an easier, more affordable option, Tefertiller points out that a venting process is less energy efficient over time since a shop is pumping out air that a producer has already paid to heat or cool. "These fumes and particulates can also be harmful or offensive to neighbors, and potentially harmful to the environment when vented outside," he adds.

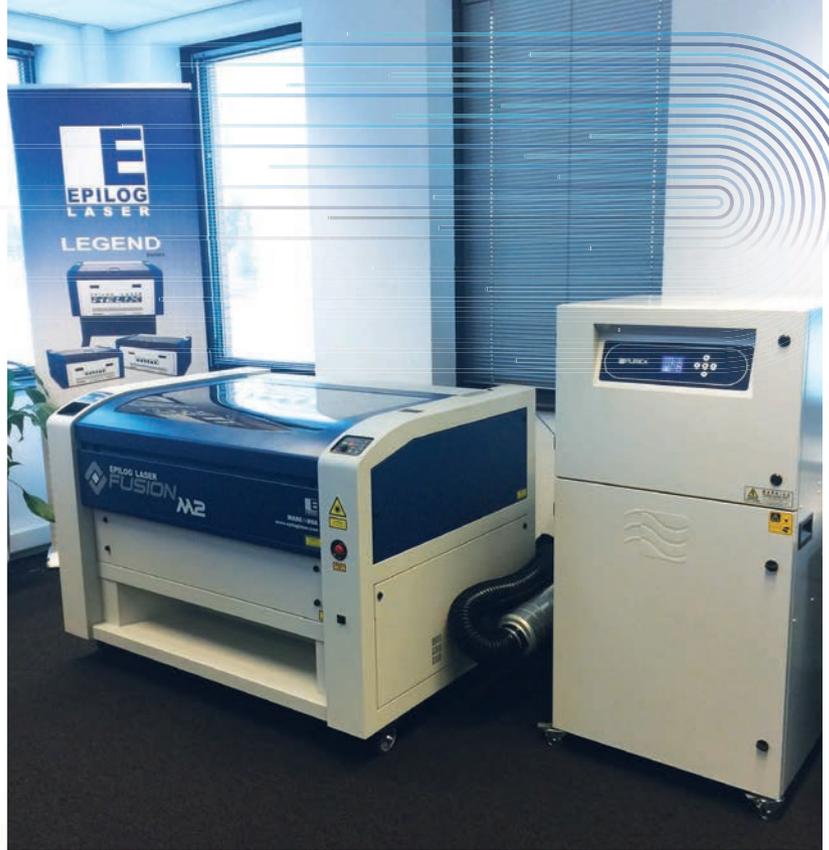
Producers should also be aware that not all fume extractors are the same, so some preliminary research is essential to ensure they purchase a machine that fits their business model.

WHAT TO LOOK FOR

When shopping around, build quality is a crucial starting point since that is indicative of how long the machine will last, and how durable it is. Scott Snell, Purex Fume Extraction by BSE, also suggests that producers look to manufacturers that offer a broad set of fume extractors. This way, if a shop ramps up output or expands its production space, they'll have the option to upgrade to a larger machine that can handle higher-capacity fume and particulate content.

Tefertiller suggests shop owners consider what materials they process, the size and type of equipment they use, the amount of airflow required, location of the operation and equipment, and how many hours a day they plan to use the fume extractor.

For laser engraving and cutting, it's crucial to find a unit that can handle fume extraction for materials ranging from PVC to Kevlar. "You'll want to change your filtration media to adjust to the toxins coming



Left: Knowing a production area's floorspace is helpful in choosing an extractor. (Image courtesy PAT Technology) **Above:** Producers should ensure the extractor is as close to the host machine as possible so that the blower motor isn't overworking to push air through the ductwork. (Image courtesy Purex Fume Extraction by BSE)

off of that material," explains Snell. He also suggests those working with acrylics ensure they're using the specific filtration for that product. "All plastics except for acrylics, when you cut them, make roughly 80% particulate and 20% gas. With acrylics, it's the other way around. It's about 40% particulate and 60% gas, so you'll go through your carbon filter faster than you would your particulate-arresting filter."

Shops who offer dye-sublimation, wide-format, and UV printing can also benefit from fume extraction, but it takes a little extra work to find the right machine and setup. "(These disciplines) are a different animal because they have different chemistry," Baird says. While laser fume extraction involves dry chemistry, disciplines like sublimation are wet chemistry that involves moisture, so he advises shops to consult with the manufacturer to ensure they're using the proper filtration.

Some wide-format and sublimation printers come with a tap designed to hook up to the fume extractor. Still, parties agree that these aren't a standard feature on all brands. Consulting with the manufacturer on this apparatus is a good starting point since decorators must ensure the two machines connect seamlessly.

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Shops should consider companies who offer a range of filters and extractor sizes, since many businesses expand and grow their product line. (Image courtesy BOFA)



Choosing the right fume extractor depends on factors such as production output and materials a shop is working with. (Image courtesy Purex Fume Extraction by BSE)



Many extractors feature an onboard indicator so users know when it's time to change out the filter. Producers can consult with manufacturers on the substrates they're cutting and printing to ensure they're using the correct filtration in their machines. (Images courtesy BOFA)

Snell suggests those involved in moisture-producing disciplines consider the airflow on their extractor machines. "There are two schools of thought in fume extractors; there are those where the air comes in at the top and out at the bottom, and those where air comes in at the bottom and out at the top," he explains. He suggests reverse airflow machines to manage the moisture and avoid any excess water getting into the fume extractor for processes like sublimation and wood engraving.

In addition to machine construction and application-specific filters, Baird urges producers to pay close attention to the construction of the filters they use. Since many fume extractors have a prefilter for large particulates, a HEPA filter for finer particulates, and a carbon filter for chemicals, "... it's important that all three filters are separate and their construction needs rigidity," he contends.

Baird suggests that an all-in-one filter may seem like a convenient option at first but can cost more over time if it's not built to last. With some filters, he adds, like those made with cardboard construction, there's the potential for leakage in the prefilter as the machine's blower ramps up, which can, in turn, contaminate the HEPA filter. Tight weaves on the filter to capture more particulates as well as sturdy, aluminum frames, and filter classifications between F8 and F9 are some key components to look for, he states.

WHERE AND HOW TO SET UP

Since extractors tend to generate noise, shops should position the machine, particularly in conjunction with a laser, in a spot that won't be disruptive to front-facing parts of the business like a customer service or order pickup area. "Even a high-quality laser with a high-quality fume extractor can be a bit of a challenge to talk over," Snell says. Generally, producers should try to position both units near the back of the shop.



THINKING ABOUT GOING THE DIY ROUTE WITH FUME EXTRACTION? YOU MIGHT WANT TO THINK TWICE. HERE'S WHY:
<http://gpro.ly/diyfume>.

When it comes to setting up the extractor with the laser or printer, sources contend closer is better. Keeping a minimum distance in the ductwork between the units prevents the blower motor from working as hard to mitigate fumes. Plus, Snell says, if ductwork between the extractor and machinery is too long, it also “translates to higher vacuum pressures and your filter life perceived as being shorter because your machine can only blow air for so far.”

Baird suggests that with laser fume extraction, a key factor is knowing the X and Y of the cutting area, or with printing “you’ll need to know the length of the cavity that’s being printed in,” he explains. “(With this info), you can get a smaller device to do a good job at capturing particulates and odor and releasing clean air into the room.”

Depending on the style of extraction a shop goes with, square footage may or may not play into capacity. Sources contend that any fume extractor that’s designed as a source capture machine means that it captures fumes directly at the source, so the room’s physical size won’t necessarily be an issue. Plus, Tefertiller points out, a direct source-capture unit allows for more flexibility because the unit can be moved to whatever location the equipment is needed.

Room-based purifiers meanwhile remove particulates radiating from machines in a production area. The drawback to this method, Baird suggests, is that “the only time that room is truly clean is when all the machines are off, and no one is in the room.”

TOOLS AND MONITORING

When it comes to monitoring fume levels, the consensus is that most extractors feature onboard monitoring systems and often include continual monitoring of VOCs and particulates. Others feature real-time monitoring, typically with an LCD screen, so that users can keep an eye on the levels.



It’s generally recommended to place extractors away from areas like customer service and order pickup desks since they generate some noise. (Image courtesy Purex Fume Extraction by BSE)



Purchasing a higher-capacity extractor might save shops money over time, even if it costs more up front, since it’ll help reduce operational costs. (Left image courtesy PAT Technology; right image courtesy BOFA)



Usually, most extractors also have meters to let the operator know how blocked a filter is, and when it's time to change the filter out, sometimes accompanied by an audio alarm. Paired with these onboard features, "the best sensor in the world is your nose," Baird argues. "If you smell it, it's time to start changing your carbon."

Shops on a tighter budget can also opt for more analog-style filtration units, which still help filtrate particulates and fumes but won't necessarily have an onboard monitoring system or a return airflow. If monitoring specific gases from materials like acrylic, rubber, leather, and/or wood, producers can invest in a gas sensor as well as an air quality monitor for extra insurance.

Aside from the built-in features of an extractor, producers must ensure what they're purchasing fits their business from a regulatory standpoint. Snell advises shops to talk with their distributor or manufacturer about what kinds of products they're using the fume extractor with, and what their output volume looks like as it will narrow down which machine best fits the business.

This is important because officials known as Certified Laser Safety Officers are charged with ensuring the health and safety aspects of lasers in the workplace. While larger engraving and graphics companies, such as those in the Fortune 500 category, might have a department focused solely on compliance and safety, smaller mom-and-pop operations are responsible for staying on top of everything from human resources, to fire code, to laser regulations. Consulting with the manufacturer helps them stay informed and, ideally, sidestep any issues with ordinances or fines.

POWER CONSIDERATIONS

Power considerations for a fume extractor are typically relative to the printing or engraving machinery it's working in conjunction with. For example, a smaller laser usually runs on single-phase power; hence the fume extractor is also able to run on single phase.



In regard to power consumption, extractors typically require the same power as the host machine. (Image courtesy Purex Fume Extraction by BSE)

If a shop is considering running multiple lasers, or other fume-emitting equipment, simultaneously, Snell suggests that this scenario may warrant upgrading to three-phase power. This way, the shop can run a heavier-duty extractor that can keep up with all the machines' output or multiple extractors if necessary. With square footage, Snell estimates the capacity for three-phase to be roughly around 1,000 CFM.

Baird points out that in PAT Technology's case, the company tends to follow the requirements of the host machine, so if a business is already equipped to run its printer or laser, they shouldn't necessarily need to upgrade those requirements.

If upgrading to 220V, sources urge producers to consult a professional electrician. Aside from ensuring a safe installation, working with a contracted professional sidesteps any issues of machines in the production area not getting the correct amount of power they need to operate, and avoids any damage that could occur from hooking equipment up to improperly configured electrical setups.

All sources agree that when a shop is ready to invest in a fume extractor, they should consider operational costs and

capital expenses, rather than the lowest price ticket on a machine. Some extractors cost more upfront, but Baird presents an example of how that cost will pay for itself. "When you're dealing with certain materials like acrylic, you want the largest carbon filter possible," he stresses, explaining that if a shop opts for a smaller machine, they'll spend more time and money continually replacing the filter. "An 80-pound capacity machine will cost you more to buy, but over time, it'll be less expensive from an operational standpoint."

By consulting with fume extractor specialists, producers can find the ideal combination of a machine that fits their business and a piece of equipment that fits into their operational budget. Best of all, they'll be equipped with a device that helps maintain a clean, safe environment for themselves, employees, and customers. **GP**

MIKE CLARK is the editor-at-large for *GRAPHICS PRO* magazine and parent company NBM. He previously served as the associate editor for *Printwear* and *Sign & Digital Graphics* magazines. Contact him at mclark@nbm.com.