The Case for Electrostatic Air Filtration

There is no effective competition to Our electronic air filter. But there are other commonly used ways of clearing the air whose drawbacks need explaining.

Natural ventilation

The oldest, cheapest and simplest method is to open a door or window to let in 'fresh air'. This form of ventilation is uncontrollable, not related to the problem in hand, and likely to cause more discomfort from draughts than it attempts to alleviate. It is also likely to let in air which is as polluted as the air you are trying to let out.

Mechanical filters

The effectiveness of any air cleaning apparatus should be rated against the type of contamination it sets out to trap. Unqualified claims for effectiveness are meaningless: for instance a road-roller could be rated 100 per cent effective - if its job was stopping traffic!

A mechanical filter can be very effective, for a while, against large contaminant particles, but it won't trap the smaller particles, which in fact make up 9 per cent of all airborne contaminants. Allowing for a degree of latitude, a mechanical filter could be said to be 5-10 per cent effective in trapping all airborne particles. Using the same criteria, an electrostatic air cleaner will trap 70-95 per cent of all particles.

Powertech Fumekiller / Dustkiller , in fact uses mechanical filters as pre-filters in its electronic air cleaners, removing the larger particles and enabling the electrostatic section to operate without hindrance in its more important job of removing the particles which are too small for a mechanical tilter to catch.

A word is needed about what big and small particles are. The size of airborne particles is normally measured in microns. A micron is 0.001 mm, or about 1 /25400 in. A pencil dot is around 50 microns across.

Mechanical filters will trap particles of about 5 microns and bigger. These particles are just about visible without the aid of a microscope, and include such things as cement dust, pollen, fly ash and some bacteria.
Smaller particles, which will pass through a mechanical filter but will be trapped by an electronic air cleaner, include oil smoke, tobacco smoke, cooking oil smell, some viruses, carbon black, welding fumes, fine fly ash and ground talc.
The smallest particle which can be trapped by an electrostatic air cleaner is around 0.01 microns (about 1/10,000 the diameter of a human hair) which is 500 times smaller than the smallest particle that can be caught by a typical mechanical filter.

Mechanical filters are reasonably efficient at filtering large particles out of the air. But the more efficient they are, the less efficient they become, as the dirt they have removed collects in the filter mesh and gradually reduces the filter area left to catch more dirt. After a while the filter is too clogged to be effective and often has to be thrown away.

There is no effective competition to Our Fumekiller / Dustkiller electrostatic air Filters . But there are other commonly used ways of cleaning the air whose drawbacks need explaining. Electrostatic air filters don't trap the dirt particles directly across the airflow like a mechanical filter, but the particles are deposited on the collector plates in line with the airflow, so there is a much less noticeable build-up of resistance.

The collector plates eventually need cleaning, and then it is a simple task to remove them, wash the dirt off and put them back. Some of the industrial units have their own automatic washing systems built-in.

Extractor fans

The third approach adopted for clearing the air is not to attempt to clean it, but just to blow it outside with a fan. This is clearly unacceptable in many situations where the fan is blowing out air that has been heated, replacing it with air from outside that has to be heated, only to be blown back outside again.

It can be shown that up to 80 per cent of the cost of heat wasted in this way can be saved by recycling the heated air through an electronic air cleaner rather than wasting it with an exhaust fan. This is another direct financial benefit to add to those achieved on reduced cleaning and decorating bills.

In an industrial context, while not necessarily having any directly harmful effect on the environment, a policy of exhausting contaminated air outside into the atmosphere could cause bad feeling between a factory and its near neighbours.

There are other drawbacks to extractor fans. One is that the more air they are able to move, the noisier they are, which is particularly disadvantageous in commercial installations. But more importantly they have to be bigger and therefore noisier - than the fan which moves the air through an electrostatic air filter because, in ideal ventilation terms, they are working back to front.

The tendency of extractor fans to draw air from sources of least resistance, such as through open doors, is the cause of at best a slight draught under doors, and at worst, a corridor of air moving from door to fan, between two banks of unaffected stale air.

Of course, the air circulation of a fan or an air cleaner depends largely on how it is sited . Let's investigate how an electrostatic air filter system is much better to use than an extractor fan for the removal of airborne contamination. A general principle of ventilation states that a fan will influence the surrounding air greater on the outlet side of the fan than on its inlet. This is because you can control the outlet air far easier than you can the air entering the fan. Taking the principle a step further, a fan will blow air 30 times farther than it will draw. Consider the following example and figure.

If we measure the air movement in any direction on the inlet at dia. (2 ft.) away from the face, we will find that it will be only 400 FPM. However we will have to measure 30 dia. (60 ft.) away to read the same 400 FPM velocity.This is why we want to blow air in a definite pattern with our electronic air cleaning system. In many cases, an extractor fan simply, will not move the air.