

A man wearing a blue polo shirt with "ROWAN UNIVERSITY MECHANICAL ENGINEERING" on it, safety glasses, and a white respirator mask is working at a table saw. A dust collector is attached to the saw, and a white air filtration system is mounted on the wall above. The man is focused on his work, and the scene is set in a workshop.

TOOL TEST

Air Filters

These can help, but collecting dust at the source is the only way to be safe

BY ERIC W. CONSTANS

Wood dust can cause health problems ranging from nasal irritation to bronchitis to cancer, so you should take steps to protect yourself from those hazards. The first and by far the most important step is attaching all of your machines and as many power tools as possible to a dust-collection system. You also should wear a dust mask when sanding or producing fine dust some other way.

A third step that some woodworkers take is to hang an air filter in their shop. However, some have challenged the effectiveness of these units, claiming that air filters at best do not improve the

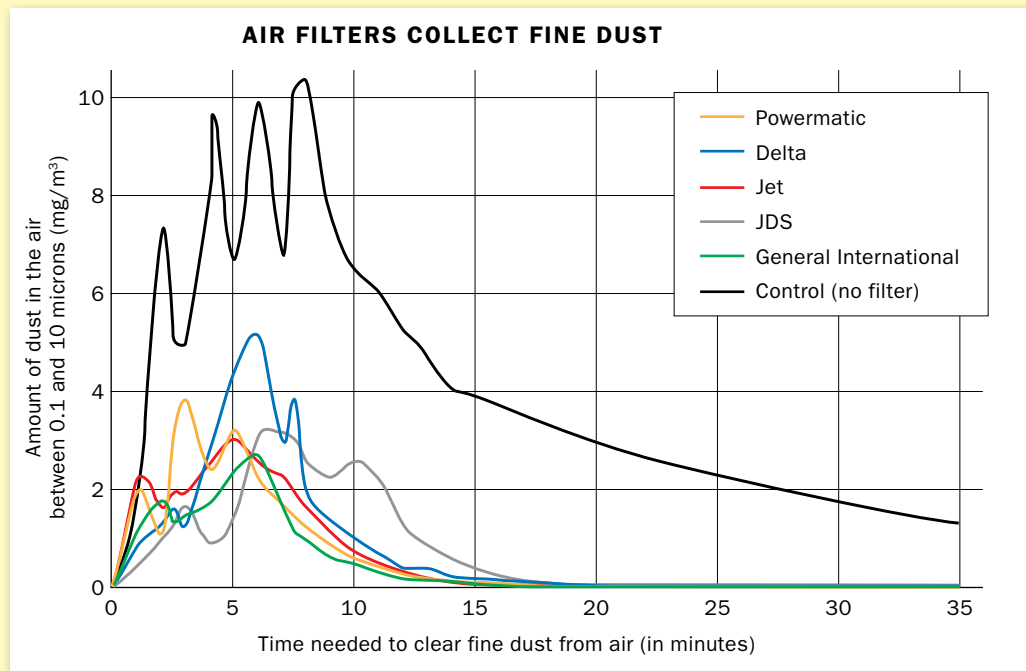
Rowan University did the testing

The author, a mechanical engineering professor, designed and performed a real-world test on the air filters. With the help of some advanced engineering students, he built a special room, conducted several woodworking tasks—cutting on the table saw, routing, and sanding—and then used an aerosol dust monitor to track how quickly the filters were able to remove the finest dust in the air.

They made some dust. After turning the air filter to its highest speed, the students ripped MDF at the table saw, routed dados in a poplar board, and sanded a piece of red oak. They used the tools in succession and it took about seven minutes to get through all three.



Then turned on the meter. The monitor used to track dust concentrations detects particles between 0.1 micron and 10 microns, so it provided an accurate reading of whether the filter was collecting the most harmful dust.



TEST MONITORED SMALLEST PARTICLES IN THE AIR

Constans and the students set up a typical shop space and sealed the room with foam window seals and duct tape. Then they used the aerosol dust monitor, set up at eye level, to determine the amount of fine dust normally suspended in the air, and that became the control level (0). Then, after completing three typical woodworking tasks, they took a reading once a minute for the first 15 minutes and then once every five minutes until the dust concentration in the air returned to the control level. They also ran the test without an air filter to determine whether the filters did a better or worse job than just allowing the dust to settle. And they cleaned and vacuumed the room thoroughly after each test.

quality of shop air, and might even make things worse. The claim is that the filters don't catch the smallest and most dangerous dust particles, but rather keep them suspended at head height.

With this in mind, *Fine Woodworking* asked me to put several air filters to the test. With the help of my students at Rowan University, I put together a mock shop and generated wood dust via a fixed amount of sawing, routing, and sanding, and then used scientific equipment to determine how well the air filters collected the finest dust, between 0.1 and 10 microns. We chose that size range for a number of reasons: It is the most difficult to collect, and it is considered to be the most dangerous because it hangs longest in the air and penetrates deep into the lungs. I discovered

that these units do improve air quality, but that they don't keep it at levels that experts would consider safe. For that you need to collect dust at the source, with proper ports each machine and tool that produces it.

Air filters do their job—eventually

We chose to test ceiling-hung filters, priced between \$300 and \$440, and intended for use in a typical home shop—about 400 sq. ft. with 8-ft. ceilings. We tested five air filters: the Delta 50-875, the General International Pro Turbo 10-550, the JDS Air-Tech 750-ER, the Jet AFS-1000B, and the Powermatic PM1200. Grizzly, Laguna Tools, and Penn State Industries also make air

All were in the same ballpark

The General International Pro Turbo was the most efficient, needing 15 minutes on average to clean the finest dust from the air. However, all of the units managed the job in 20 minutes or less.

FEATURES ADD CONVENIENCE

All have remote controls. Not merely remote on/off switches, they let you control the fan's speed and how long the unit stays on. The fan icon on Powermatic's digital readout spins faster as the fan's speed increases.



Gauge tells you when to change the filter. The Delta, Powermatic, and General International have some kind of indicator to tell you when the filter needs changing. On the others, you'll have to make a visual check, which isn't hard.



Two-stage filtering. The outer filter traps dust as small as 5 microns. This is the filter you'll change most often, but it is a standard size, available for under \$20. The inner filter collects dust down to 1 micron. It is more expensive, and available from the manufacturer.



Delta 50-875

Street price: \$415 Source: deltaportercable.com

Motor: 1/6 hp Speeds: Three

Performance: Good

On average, the Delta needed 20 minutes to remove the fine dust from the air. Filter changes are only slightly more difficult than on the Jet. In terms of noise, it's in the middle, a steady hum that's not as quiet as the JDS or the Jet. It has a gauge that indicates when the filter needs changing. As airflow through the filters slows, a needle swings into a red zone, letting you know it's time to change the filters. The remote has one button for power, a second for adjusting the fan's speed, and a third for adjusting the timer, which has four settings: 1/2 hour, 1 hour, 2 hours, and 4 hours.



filters in this range, but they declined to participate in the test. All of the units tested use two filters to clean incoming air. An outer filter traps dust 5 microns and larger, while an inner, pocketed filter collects dust down to 1 micron.

After all of our testing was completed, it was clear that these air filters did in fact clear the air of the finest wood dust, but it took them up to 13 minutes to do so after the woodworking stopped. Without source collection in place, there was far too much dust left in the air in the meantime. So the first thing to take away from our test is that proper collection at the source is the only way to be safe. That said, you might want to consider a ceiling-mounted air filter for mopping up everything your dust-collector misses.

When it came time to pick a winner, we looked at more than just how quickly these units cleaned the air. Since they should be left running for a while after you turn off your power tool or machine, we also considered how much noise they made. The JDS and the Jet were the quietest. On filter changes, the Jet edged out the other air cleaners. Its outer filter is held in place by two easy-to-work clips, and the inner filter is easy to remove, too.

After all was said and done, the Jet AFS-1000B was our pick for best overall. It cleaned the air nearly as fast as the General International, but it is quieter and has easier filter changes. And as the least-expensive unit tested, it's also the best value. □

Eric W. Constans has a Ph.D. in mechanical engineering and is the chair of the Department of Mechanical Engineering at Rowan University in Glassboro, N.J.



General International Pro Turbo 10-550

Street price: \$430 Source: general.ca
 Motor: 1/8 hp Speeds: One
 Performance: Excellent



The Pro Turbo cleaned the fine dust the fastest, needing only 15 minutes on average. However, there is a noticeable whirl noise made by the fan. It's just enough to become a nuisance when the unit is running in an otherwise quiet shop. And because the fan has only one speed, you can't turn on a lower speed to lessen the noise. Filter changes are not difficult, but they are not as easy as on the Jet. A light indicator tells you when the filters need to be cleaned. The remote allows you to turn the machine on and off and to set the timer, which can be set in increments of one hour, up to 15 hours.



JDS Air-Tech 750-ER

Street price: \$340 Source: jdstools.com
 Motor: 1/4 hp Speeds: Three
 Performance: Good



The JDS needed 20 minutes on average to collect the fine dust, but it is the quietest. The outer filter slides out the side, which is unique, but not a real advantage. The inner filter also comes out the side, but only after you remove a thumbscrew. A diffusion filter on the exhaust side lessens turbulence and, according to the manufacturer, improves filtration. This unit has the second-best remote. You can use it to power the machine on and off, control the fan speed, and set the timer in one-hour increments between one and four.



Jet AFS-1000B

Street price: \$300 Source: jettools.com
 Motor: 1/8 hp Speeds: Three
 Performance: Excellent



The Jet cleaned the fine dust second fastest, taking an average of 16 minutes to return the air to the control level. In addition to its stellar performance, its filters are the easiest to change and it is second only to the JDS Air-Tech 750-ER in terms of noise. The remote has a button for turning the machine on and off, one for adjusting the fan's speed, and one for setting the timer, which can be set to two, four, or eight hours. This machine does not have an indicator for when the filters need to be changed, but a quick look at them will tell if they are dirty.



Powermatic PM1200

Street price: \$350 Source: powermatic.com
 Motor: 1/4 hp Speeds: Three
 Performance: Very good



The Powermatic collected the fine dust in 17 minutes on average. Unfortunately, the fan has an annoying whine at high speed, and filter changes are a bother, because removing the grill covering the end requires too much effort. It has a filter for diffusing exhaust air and a small indicator light on the control panel that lets you know when the filters need changing. The remote is the best. There are three buttons: one for power, one for fan speed, and one for the timer, which can be set by increments of one hour, up to nine hours.