



Dustworthy companions

We test 110-volt dust collectors at or under \$300

To your grandfather, “dust collection” in the shop meant a broom and dustpan. But, as we’ve learned more about the health hazards of workshop dust, woodworkers have placed a higher priority on collecting debris at its source. And, tool manufacturers have followed suit by including dust-collection ports on more of their products.

Of course, to use those ports, you need a dust collector. For this article, we put nine dust collectors—all with 110-volt motors—through their paces. These single-stage models, rated at 1 or 1½ horsepower, have enough suction to effectively pull dust from any home woodworking machine. And, at a top price of only \$300, you needn’t worry about sucking your bank account dry.

Airflow expert Dr. Greg Maxwell (background) records data while *WOOD*® magazine tool tester Jeff Hall adds resistance to the airflow during testing of the Delta 50-850.

Accurate ratings require sophisticated tests

After assembling the machines, we “seasoned” the filter bags twice by sucking up equal amounts of workshop dust, then emptying them and tapping them clean. This simulated workshop conditions in preparation for the airflow tests.

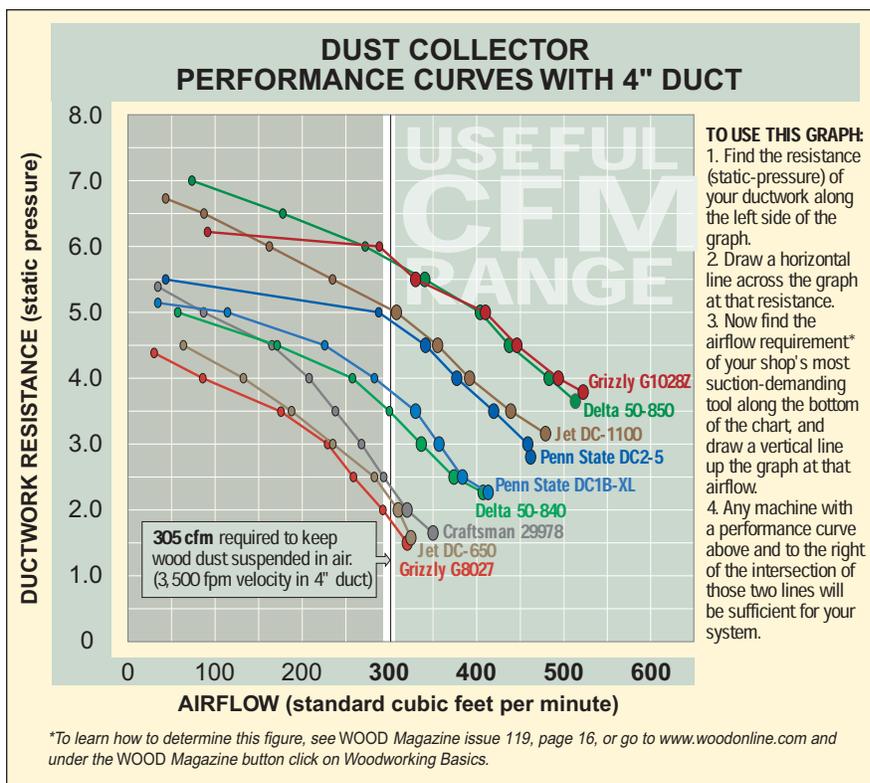
To ensure the validity of our testing, we enlisted Dr. Greg Maxwell, an airflow expert from Iowa State University. With his help, we built a test rig (shown on *page 1*) consisting of 40' of 4"-diameter PVC pipe with a pitot tube at the dust-collector inlet and a manometer (to measure air velocity and static pressure). At the open end of the pipe, we mounted an adjustable restrictor, which we gradually closed to simulate specific static pressure (SP) losses. These SP losses represent the resistance caused by ductwork that you might add to the collector.

Using the data gathered at each SP interval from wide-open to closed, we built a performance curve for each model. The performance curve shows the volume of air the dust collector can move at various static pressures. While conducting those tests, we also measured the maximum amperage of each motor at 110 volts. And, we took sound-level readings using a decibel meter mounted about 6' high and 8' from each collector.

Finally, to see how high-efficiency, 1-micron filter bags would affect airflow, we equipped each collector with 1-micron bags made to the same dimensions as the original bags. We then repeated the airflow test, and again built a performance curve for each model.

First, figure how much collector you need

Many woodworkers first buy a dust collector, then figure out how they'll connect it to their tools. However, it makes more sense to plan your ductwork (even if it's only a piece of flexible hose) before you purchase anything.



That's because every inch of duct diameter, every foot of length, and every elbow adds resistance (SP loss). As the resistance increases, the volume of air the dust collector can move through the ductwork (stated in standard cubic feet per minute, or SCFM) decreases.

Once you decide on what size ducting to run and where, you can calculate the total SP loss in your ductwork. In *WOOD*® magazine issue 119 (page 16), we give detailed instructions on figuring your dust-collection needs. (If you don't have that issue, you'll find the article on our Web site—www.woodonline.com. Under the *WOOD* magazine button, click on Woodworking Basics.)

Before you hunt for the article, though, let's look at a quick example of SP loss in 4" duct. A tablesaw requires 350 cfm of airflow. Hook it up to your dust collector with a straight 10' run of rigid duct and 5' of flexible hose, and your dust collector will have to draw 350 cfm at 1.75" of static pressure. Hook your tablesaw directly to the dust collector with 10' of flexible hose, and

now the dust collector has to draw the same 350 cfm, but at 2.1" of static pressure.

These curves show real-shop performance

The air through a dust-collection system must move at a rate of least 3,500 feet per minute to keep wood-working dust and debris suspended until it reaches the collector. In order to achieve that velocity through 4" round duct, a dust collector must pull no less than 305 scfm. As the Dust Collector Performance Curves With 4" Duct chart, *above*, shows, all of the models achieved at least that level with our test rig attached.

But what happens when you add ductwork to the collector? The resistance added by the ductwork reduces the speed and volume of air moving through it. So, for example, if you add a 90° elbow and 1' of straight pipe (enough to increase the resistance to 2"), the Grizzly G8027 falls below the minimum airflow requirement. The Craftsman 29978 and Jet DC-650 performed only a little better. These machines are

suitable for use only with a short run of flex hose on most wood-working tools.

On the other hand, you could increase the resistance on the Delta 50-850 and Grizzly G1028Z to nearly 6"—that's about 40' of 4"-diameter straight pipe and two 90° elbows—before their airflows would drop below 305 scfm, making them good candidates for a mid-sized central dust-collection system. The Jet DC-1100 and Penn State DC2-5 also fared well in this test.

Note: Due to differences in testing procedures, our cfm ratings may not match those quoted by the manufacturers. Because we tested all of the machines identically, our numbers provide a fair head-to-head comparison of the tested models. However, don't compare our numbers to the published specs of dust collectors not in this test.

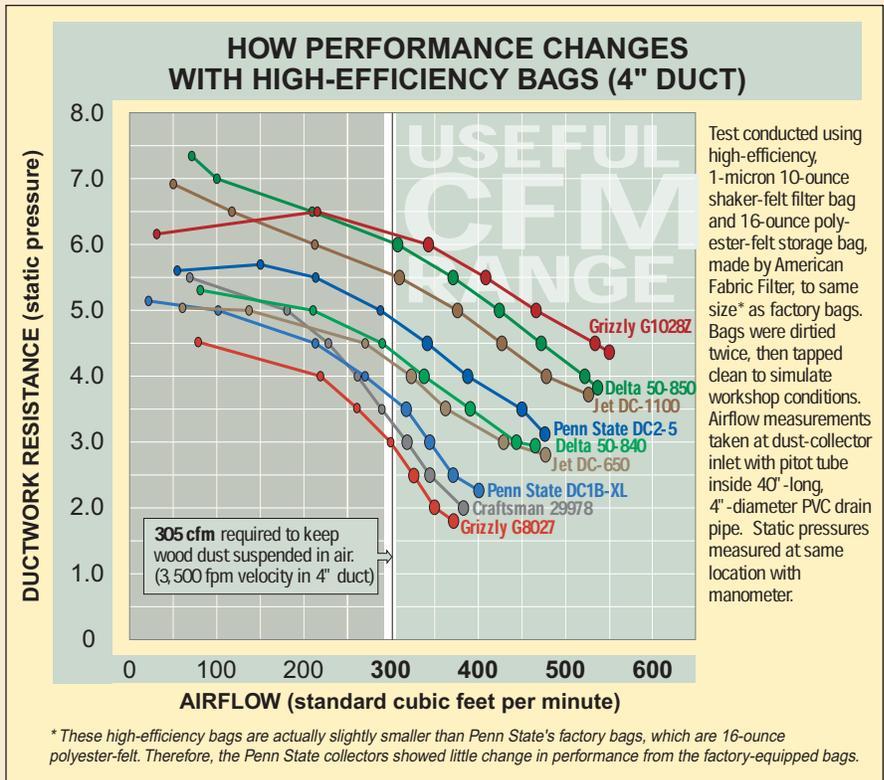
For most, "filter bag" is a misnomer

All of the dust collectors in our test have two bags. The top bag functions as a filter, separating dust particles from the air as it passes through the bag and back into the shop. The bottom bag, made from the same material as the top bag, stores the collected dust while also providing some filtration.

The bags on most of the tested collectors won't trap anything smaller than 30 microns. That disappoints us, because particles from .5–10 microns in size are the most hazardous to your respiratory system, and these bags don't come close to that filtration level. Only Penn State ships polyester/felt bags that filter down to 5 microns.

Even 5-micron bags allow hazardous dust through, however. Fortunately, Delta, Grizzly, and Jet offer 1-micron bags as an optional upgrade, and we think they're worth the extra expense. (See What You Need To Know About Aftermarket Bags, right.)

What you need to know about aftermarket bags



We were curious to learn how high-efficiency, 1-micron filter bags would affect the performance of the collectors, so we asked American Fabric Filter (800/367-3591) to craft a set of 1-micron bags for the dust collectors in the test, made to the same dimensions as the factory bags.

After seasoning the new bags, we duplicated the airflow test, and as you can see by the How Performance Changes With High-Efficiency Bags chart, above, the 1-micron bags improved the airflow of the models by up to 133 scfm, while keeping all but the tiniest dust particles contained. How can this be? Although the 1-micron "holes" are significantly smaller than the 30-micron "holes" in the original-



The optimized bag set for the Grizzly G8027 performed better—even with the storage bag full—than the factory bags did when empty.

equipment bags, there are also substantially more of them, which explains the improved performance. (Penn State's performance didn't change much with the upgraded bags because their 5-micron bags are already more efficient than the others, and slightly oversized.)

AFF's Stan Wnukiewicz told us he could improve the performance of the collectors even more. For the best suction, he typically oversized the filter bag—sometimes even doubling its size—for optimal performance. So, we also let him build an “optimized” set of bags, shown in **Photo A**, for the lowest-volume collector in the test—the Grizzly G8027—to see how much we could increase its performance.

The Case Study chart, *below*, shows that with the optimized bags empty, we found virtually no suction difference between the factory-sized

1-micron bags and the optimized bags (although both outperformed Grizzly's empty factory bag by 33 scfm). But look at the numbers when the storage bag is full. The optimized bags added nearly 80 scfm over the factory bags while also improving the machine's static pressure level.

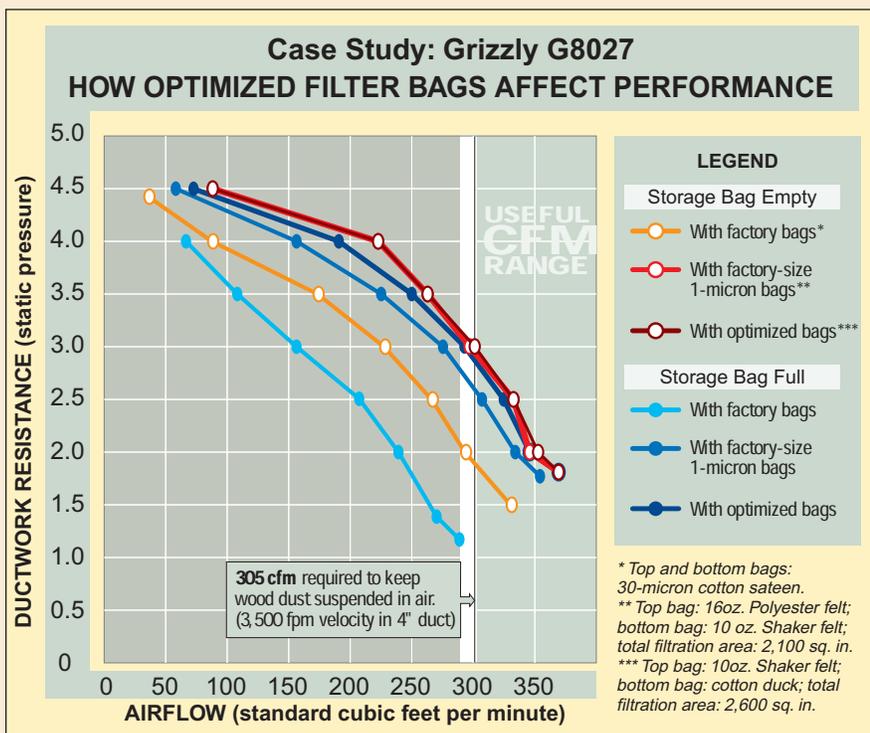
AFF's Wnukiewicz says the optimized bags he built for us, including a durable, non-breathable cotton-duck bottom bag, would cost in the neighborhood of \$100. But he can get the same performance by using a disposable 5-mil plastic bag on the bottom, cutting the cost to about \$55. All of AFF's bags are custom built, so they can tailor the bags to your space requirements and budget.

Depending on the type and amount of work you do, the capacity of the storage bag may be an issue. The debris created by a table-saw or sander won't quickly fill the small bags on the Craftsman, Delta 50-840, Grizzly G8027, and Jet DC-650. But the size and volume of chips produced by a planer or jointer can overwhelm those same bags. Delta's 50-850, with 6 cubic feet of capacity, nearly triples the capacities of those models. (Just as this issue went to press, Delta replaced the 50-840 with the 50-775. See the note under the 50-775 photo on *page 7* for details.)

Incidentally, it's tempting to let that storage bag fill up completely before emptying it, but that's a bad idea for a couple of reasons. First, as the bag fills, it reduces the total filtration area, resulting in increased pressure inside the bags, and reducing suction. Second, that extra internal pressure forces larger dust particles through the bag and back into the shop air. Emptying the bag frequently relieves that pressure. Both Penn State models and the Jet DC-650 have clear plastic windows stitched into their storage bags to help you keep tabs on bag-changing time.

Reattaching the bags to the dust collector is a chore that hasn't changed much over the years. Most come with quick-release metal band clamps, which thread through belt loops around the bag opening. The quick-release clamps on the Delta 50-850 are easier to open than the others because the release lever isn't buried in the clamp when closed. The release levers on the Grizzly G8027 are made of a soft metal that bent easily (see **Photo B**). However, after learning of our findings, Grizzly's Bill Crofutt told us they would improve the clamp.

The Grizzly 1028Z improves on the belt-loop concept with a stitched pocket around the bag opening that captures the band and makes it easier to slip over the rim. The unit we





B
The release lever on the Grizzly G8027's bag clamp bent easily when closing it. Since our test, a Grizzly spokesman told us they would improve the clamps.



C
Rather than a traditional bag clamp, the Jet DC-1100 has a spring-steel hoop stitched into the bag's mouth for effortless bag removal and installation.

tested used hose-clamp style bands that require a screwdriver to loosen and tighten, which we found a nuisance. Again, Crofutt responded by saying they would immediately switch to quick-release clamps.

Rather than a band clamp, the storage bags of the Craftsman and Jet DC-1100 have a springy hoop built in to the mouth of the bag. Collapse the hoop, as shown in **Photo C**, insert it inside the rim, and it snaps into place. Removal is just as easy, but does get more difficult as the bag becomes full.

Almost all of the bags stayed securely fastened to the rim, even with the increased back pressure caused by a full storage bag. The only exception was the Craftsman, which lacks a flange on the rim. In our tests, the filter bag popped off repeatedly and sent a cloud of dust drifting through the shop. Upon learning of this, Craftsman's Bryan Meyer told us that beginning in early 2002 they would replace the band clamp with an internal hoop like that found on the storage bag.

Mobility and more

•**Mobility.** Although we didn't have any major problems getting from place to place with these units, some are less maneuverable than others. Most have a wide base and four swivel casters, so we could move them easily in any direction without fear of tipping over. We downgraded both the Jet DC-650 and the Penn State DC2-5 because they have a pair of fixed casters and a pair of swivel casters, so steering them into a tight spot is akin to parallel parking your car.

The Craftsman and the Penn State DC1B-XL are the only units to provide an actual handle to help mobility. With the others, you grab the machine wherever you can, usually by the bag rim.

•**Noise.** Although these machines are plenty loud, they lack the annoying whine of a universal motor, so you may be tempted to take lightly the threat of hearing

damage. However, most fell in the 72-78 decibel (dB) range, with the Grizzly G8027 the quietest at 68 dB, and the Jet DC-1100 the loudest at 82 dB.

Our collective opinion

For a small central-ductwork system, the Delta 50-850 and the Grizzly G1028Z outperformed all of the other models in the test, pulling more than 500 scfm while still delivering enough static pressure to overcome the resistance of the ductwork. By the time you figure in shipping charges for the Grizzly, even the price is about a wash. If we were buying, we'd certainly spend the extra money for high-efficiency, 1-micron bags, whether from the manufacturer or an aftermarket provider.

If your plan is to move the collector from tool to tool, we think you'll

be happiest with the Penn State DC1B-XL. It delivered the most airflow of the smaller machines in our test, and comes with the 5-micron bags. Delta's 50-840 and Jet's DC-650 deserve honorable mention here: When we equipped them with high-efficiency aftermarket bags, they both outperformed the DC1B-XL. ♣

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COLLECTION INSPECTION: 110-VOLT DUST COLLECTORS

MANUFACTURER/IMPORTER	MODEL (1)	MOTOR		BLOWER		BAGS			PERFORMANCE RATINGS (5)						ACCESSORIES (7)		CORD LENGTH	WARRANTY	COUNTRY OF ASSEMBLY (8)	WEIGHT (POUNDS)	SELLING PRICE (9)
		VOLTAGE (2)	AMP DRAW (3)	INLETS (NUMBER @ DIAMETER)	IMPELLER DIAMETER (INCHES)	BOTTOM BAG CAPACITY (CUBIC FEET)	FILTRATION EFFICIENCY (MICRONS) (4)	HEIGHT WITH BAG INFLATED (INCHES)	BAG FILTRATION	BAG-CLAMPING SYSTEM	EASE OF CHANGING BAGS	MOBILITY	EASE OF ASSEMBLY	NOISE LEVEL (dB) (6)	STANDARD	OPTIONAL					
CRAFTSMAN	29978	110	7.2	1@4"	10	2.4	30	60	F	G	G	E	E	78	A,H		6'	1 yr.	T	72	\$300
DELTA	50-840*	110/220	9.9	1@4"	10	2.1	30	60	F	E	E	E	E	72	H	M	6'	2 yr.	T	57	210
	50-850	110/220	12.1	2@4"	11½	6.0	30	82	F	G	E	E	E	78	H	M	8'	2 yr.	T	100	300
GRIZZLY	G8027	110	5.0	1@4"	9	2.2	30	63	F	G	G	E	G	68		H,M,P	9'	1 yr.	C	79	130*
	G1028Z	110/220	13.9	1@6" or 2@4"	11	5.4	30	78	F	F	G	E	E	74		H,M,P	5'6"	1 yr.	T	116	240*
JET	DC-650	110/220	8.3	1@4"	9½	2.1	30	57	F	G	E	G	E	74		A,H,M	10'	2 yr.	T	84	220
	DC-1100	110/220	10.7	1@6" or 2@4"	11	4.1	30	79	F	E	E	E	E	82		A,H,M	6'	2 yr.	T	110	300
PENN STATE	DC1B-XL	110/220	7.9	1@5" or 2@4"	10	4.7	5	60	G	G	E	E	E	72	H		5'6"	2 yr.	T	66	220*
	DC2-5	110/220	10.9	1@6" or 2@4"	10	5.6	5	78	G	G	E	G	G	78	H		5'6"	2 yr.	T	130	300*

NOTES:

For specifications on other types of tools, click on "Tool Comparisons" at www.woodmall.com.

- *50-840 replaced by 50-775. See note under photo of 50-775 below.
- All models come prewired for 110 volts.

- Amperage draw at 110 volts, measured with no ductwork attached to inlet.
- Smallest particle that filter can effectively remove from airflow.

- | | |
|---|-----------|
| E | Excellent |
| G | Good |
| F | Fair |

- Measured 8' from blower at height of 5'6", with 5' of flex hose attached to inlet, and inlet facing away from meter.

- (A) 4"-to-2" adapter
 (H) Hose
 (M) 1-micron bags
 (P) Plastic bottom

- (C) China
 (T) Taiwan

- *Price does not include shipping charges.



Craftsman 29978

The convenient hooped storage bag makes removing and reinstalling the bottom bag a breeze. But this machine's suction is well below similarly priced units. Visit your local Sears store. www.sears.com/craftsman



Delta 50-775

(Replaces 50-840 in tests) Although this machine was unavailable at the time of our test, a Delta official told us that changes made to its predecessor did not change the performance of the unit. 800/438-2486 www.deltamachinery.com



Grizzly G8027

This unit costs \$90 less than any other machine tested, and not surprisingly had the lowest suction. You can hook it up to one machine with no ducting and get by. 800/523-4777 www.grizzly.com



Jet DC-650

On the low end of the suction scale with the original-equipment bags. However, high-efficiency bags netted us an extra 133 scfm, greatly improving airflow and static pressure. Windowed storage bag shows how full the bag is. 800/274-6848 www.jettools.com



Penn State DC1B-XL

This unit delivered the most suction of the 1-hp units, and did it while capturing dust as small as 5 microns. That combination makes it our favorite for the small shop. 800/377-7297 www.pennstateind.com



Delta 50-850

A voracious collector when it comes to airflow, and one of our top picks. The quick-release clamps on this model are the easiest to operate among those tested, and felt the most substantial. A good choice for a small central-collection system. 800/438-2486 www.deltamachinery.com



Grizzly G1028Z

A top performer, about on par with the Delta 50-850 in terms of airflow. Since our test, Grizzly has switched to quick-release bag clamps on this model. Shipping costs bring this to about the same price as the Delta 50-850. 800/523-4777 www.grizzly.com



Jet DC-1100

Priced the same as the Delta 50-850, this collector doesn't perform up to the level of the Delta 50-850 or Grizzly G1028Z. We like the hooped storage bag that makes removing and reinstalling the bag a snap. 800/274-6848 www.jettools.com



Penn State DC2-5

Standard-equipment 5-micron bags provide the finest filtration in the test, but it doesn't pull numbers like the Delta 50-850 or Grizzly G1028Z. Windowed storage bag shows when the bag is getting full. 800/377-7297 www.pennstateind.com