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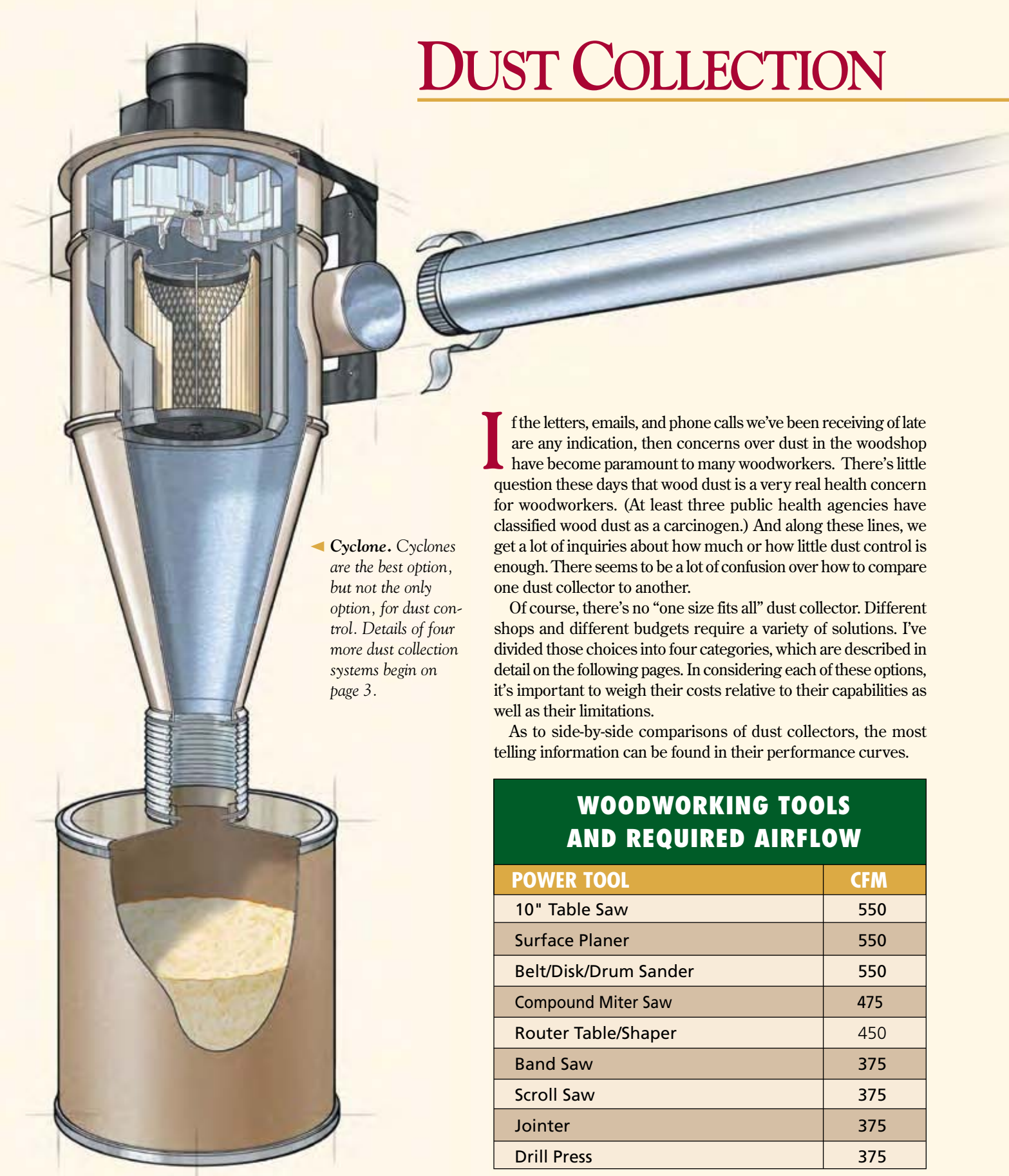
DUST COLLECTION ROUND-UP

Dust Collection



Cyclone. *Cyclones are the best option, but not the only option, for dust control. Details of four more dust collection systems begin on page 3.*

If the letters, emails, and phone calls we've been receiving of late are any indication, then concerns over dust in the woodshop have become paramount to many woodworkers. There's little question these days that wood dust is a very real health concern for woodworkers. (At least three public health agencies have classified wood dust as a carcinogen.) And along these lines, we get a lot of inquiries about how much or how little dust control is enough. There seems to be a lot of confusion over how to compare one dust collector to another.

Of course, there's no "one size fits all" dust collector. Different shops and different budgets require a variety of solutions. I've divided those choices into four categories, which are described in detail on the following pages. In considering each of these options, it's important to weigh their costs relative to their capabilities as well as their limitations.

As to side-by-side comparisons of dust collectors, the most telling information can be found in their performance curves.

WOODWORKING TOOLS AND REQUIRED AIRFLOW

POWER TOOL	CFM
10" Table Saw	550
Surface Planer	550
Belt/Disk/Drum Sander	550
Compound Miter Saw	475
Router Table/Shaper	450
Band Saw	375
Scroll Saw	375
Jointer	375
Drill Press	375

These simple graphs show how the volume of air moved by a dust collector (indicated in Cubic Feet per Minute or CFM) is affected by an increase in pressure, as when drawing air through a system of ductwork. (This is measured in Inches of Static Pressure, abbreviated as SP.)

The sample curves (below) show how two systems with similar CFM ratings fare quite differently as static pressure increases. (Performance curves for most dust collectors are available by request from manufacturers.) The table on page 1 shows the airflow required to effectively collect dust from the most popular woodworking tools.

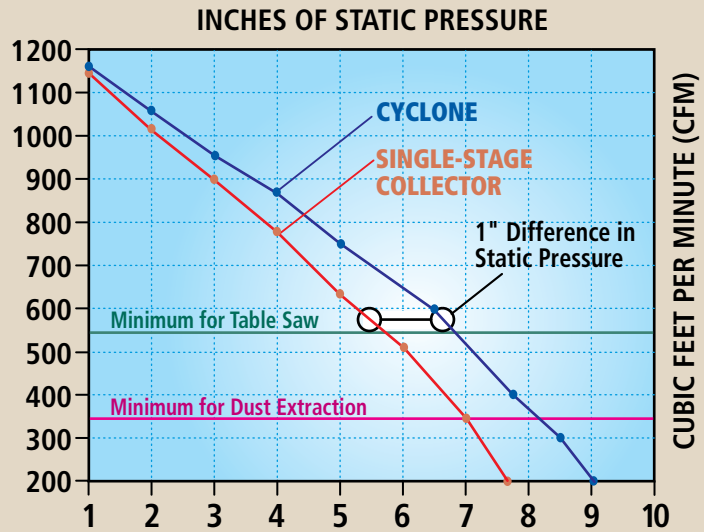
Keep in mind that every foot of ductwork and every fitting increases the pressure that the dust collector must overcome in order to maintain adequate airflow. So it's crucial that ductwork be constructed as efficiently as possible.

In that vein, the sidebar at right provides some basic guidelines for getting the best performance from your dust collector. While these guidelines are most pertinent to central systems, the principles remain the same for collectors of all size.

SAMPLE PERFORMANCE CURVES

This graph shows representative performance curves for two popular types of dust collectors. Notice that both collectors have a maximum airflow of approximately 1,150 CFM. As pressure increases, the CFM of each tool declines correspondingly. Also note the steeper decline of the curve for the single-stage collector.

At first glance, the difference in the curves seems negligible. However, if you consider at what point the collectors fall below 550 CFM (the airflow typically considered minimal for collecting dust at a table saw) the difference in the machines becomes more meaningful. The single-stage collector falls below this threshold at approximately 5½" of static pressure. The cyclone reaches the same point at about 6½" of SP. Again, an apparently insignificant difference. But consider that a mere 1" of SP difference represents almost 15 feet of 4" duct, and the cyclone's advantage is clear.



5 FUNDAMENTALS FOR DEFEATING DUST

1 ***Short & Straight.*** *The duct between the tool and the collector should be in the straightest possible line and as short as you can make it. When making turns, try to use 45° fittings instead of 90° fittings.*

2 ***Use Dust-Worthy Duct.*** *PVC pipe and HVAC dust do not make good dust collection duct. PVC creates far too much additional pressure and HVAC duct is too thin to withstand the pressure of a dust collector.*

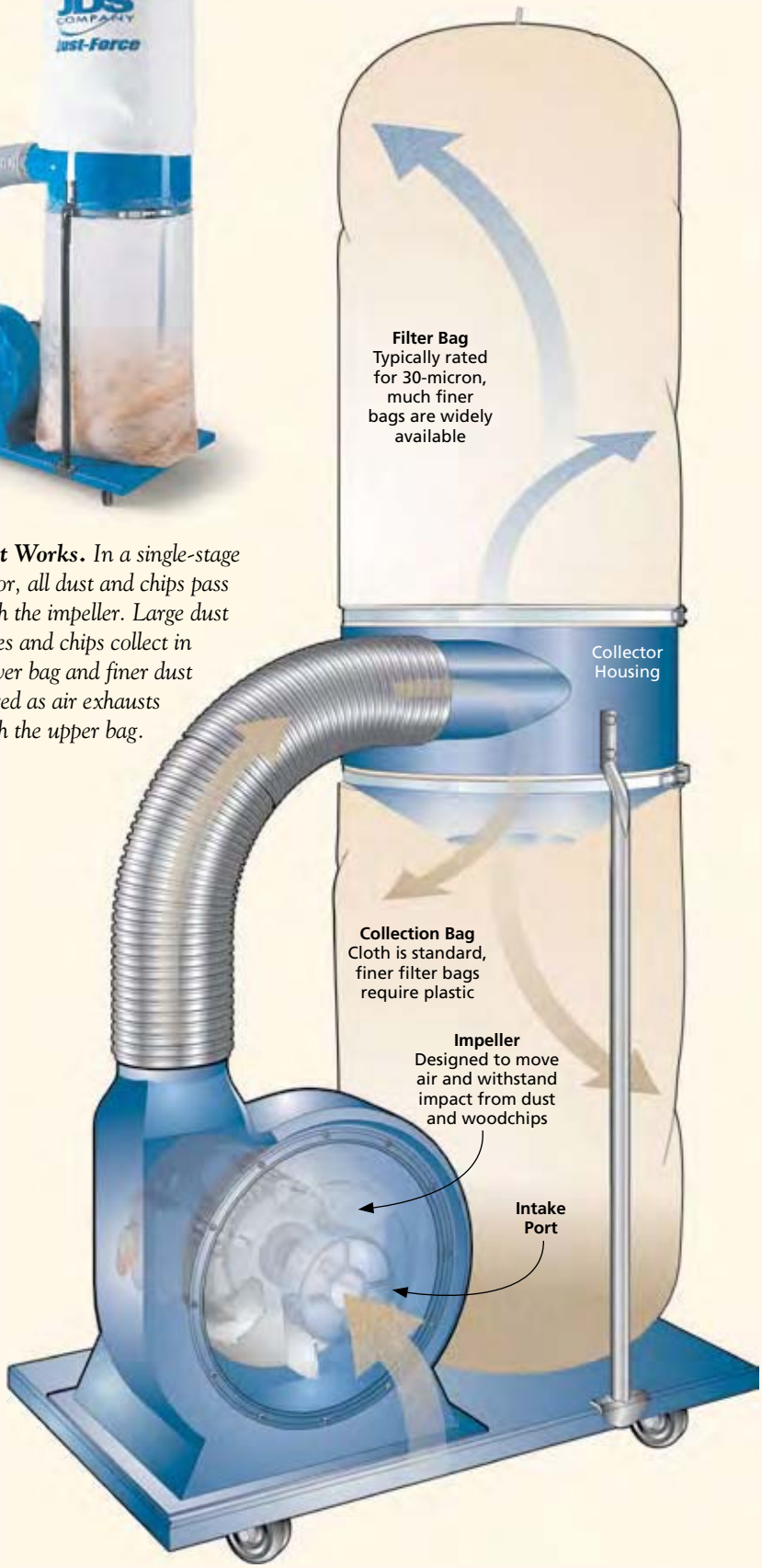
3 ***Seal all the Joints.*** *A small leak in the ductwork can have a huge impact on the efficiency of your system. All connections should be sealed using either metal duct tape (good) or silicone sealant (best).*

4 ***Use Blast Gates.*** *Blast gates ensure that you're only drawing air through the tool in use. Install blast gates at every tool branch and then use them.*

5 ***Finer Filters are Better.*** *Besides capturing a lot more of the harmful dust, a finer filter increases the efficiency of your dust collector. That's because, although the holes in a fine filter are smaller, there are a lot more of them. That allows air to pass more freely through the filter, creating less pressure for your collector to overcome.*

SINGLE-STAGE COLLECTOR

How it Works. *In a single-stage collector, all dust and chips pass through the impeller. Large dust particles and chips collect in the lower bag and finer dust is filtered as air exhausts through the upper bag.*



Single-stage dust collectors like the one represented here continue to be the most popular choice for the home woodshop. There are a number of reasons for this.

First is the relatively low cost. Single-stage dust collectors can be one-half to one-third the cost of similarly sized cyclone units.

Second are the very satisfactory performance characteristics. The 1½-hp unit shown here boasts 1,250 CFM (before factoring in any static pressure — remember the performance curve) and 42 pounds of dust collection capacity. This is more than adequate on both counts for most home woodshops.

A couple more reasons for the popularity of single-stage systems are their ease of setup and versatility. Whether your shop consists of a couple of stationary tools or an entire garage full of dust-raising woodworking machines, a single-stage collector can be configured to manage the dust effectively in short order.

Right out of the box, most of these collectors have casters on their bases. So it isn't necessary to run an elaborate system of ductwork in order to put the collector to work. You can simply roll the collector from tool to tool as you're working.

As an alternative, most single-stage collectors come standard with a Y-connector so you can connect more than one tool at a time. By using blast gates and a couple lengths of flex hose (typically not included) this can cut way down on the number of times you'll have to change the hose from one tool to another.

There are, however, some limitations to single-stage collectors such as this one. Some of those limitations can be remedied (see *Three Ways to Enhance Performance* on page 4), while other frailties are just part and parcel of single-stage design.

The most limiting factor of single-stage collectors is the fact the the impeller must be able to withstand the constant impact of flying debris (by definition, *everything* that goes into the ductwork passes through the impeller of a single-stage collector). For this reason, efficiency takes a back seat to durability in the construction of a single-stage impeller. Which is a big part of the reason these collectors suffer a more rapid decline in performance when compared to two-stage cyclone collectors.

3 Ways to Enhance Performance

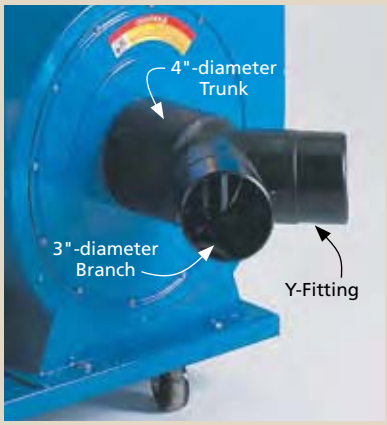
FILTRATION

1 *Several options are available to improve on the 30-micron filter bag that's standard fare on single-stage collectors. Below is a 1-micron filter bag with a plastic lower bag (this forces all the air through the filter bag). At right is a canister filter rated to trap particles as small as .5 microns.*

CONNECT IT DIRECTLY

2 *By removing the Y-fitting (photo, below) and connecting the ductwork directly to the collector, you eliminate an unnecessary restriction and are able to start with a larger diameter of duct. (Each branch of the Y is 3" in diameter. The trunk has a 4" diameter.)*

The canister filter not only captures smaller particles than a bag, but also increases filter area almost 600%.

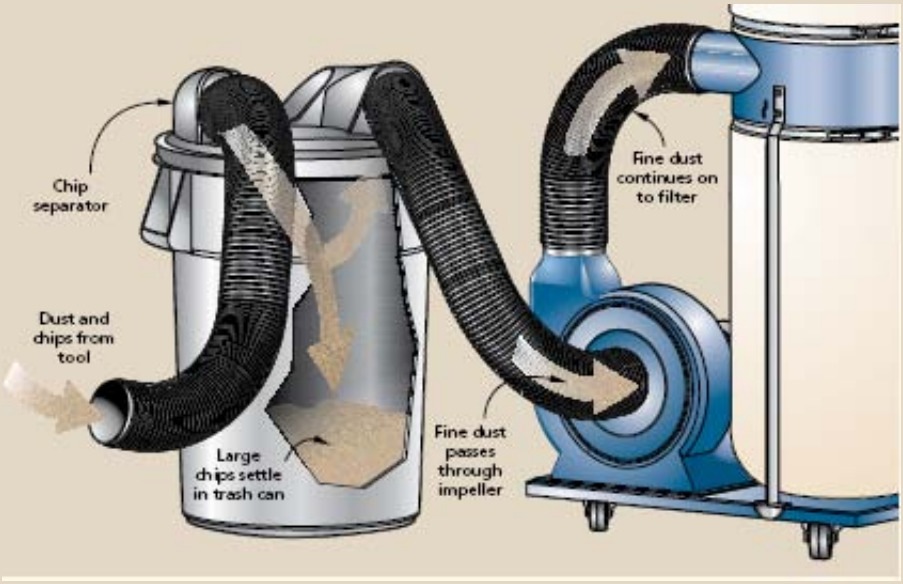


SEPARATOR

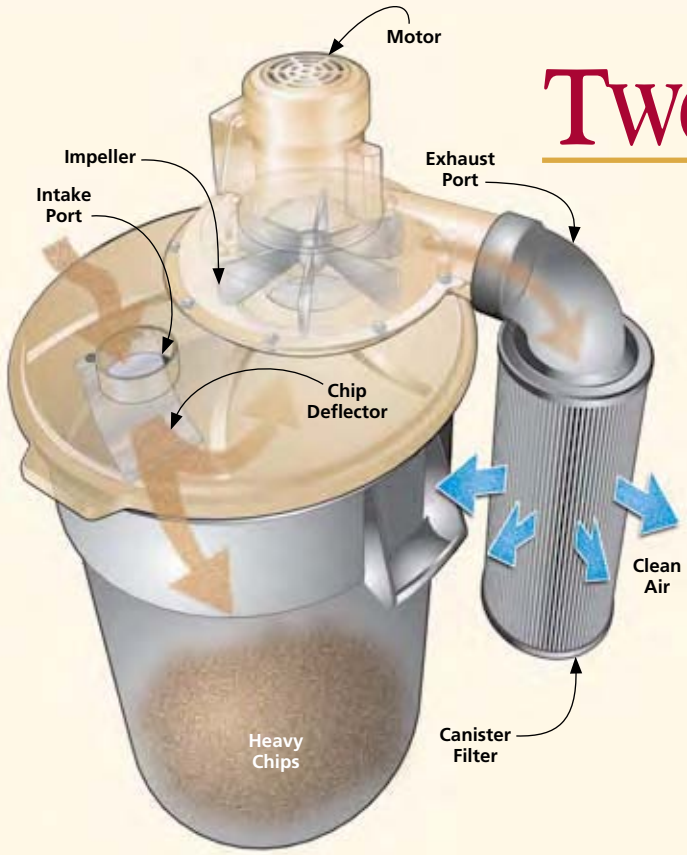
3 *Centrally located systems should also include a separator (illustration, right). This effectively turns a single-stage collector into a two-stage collector, which has a couple advantages.*

First, the large chips are collected in the separator before they can impact the impeller, which lessens damage to the impeller and extends its useful life.

Secondly, emptying the garbage can that serves as the chip collector is much easier than removing the lower bag from the collector itself.



Two-Stage Collector



▲ ***How it Works.*** *Dust is drawn directly into the garbage can, where heavy particles settle. Fine dust is captured in the canister filter.*

This two-stage collector combines space-saving portability (provided you use a trash can with casters on it) with the performance of two-stage dust collection (see photo at right). The collector fits 20-gallon steel garbage cans or 32- or 40-gallon plastic cans. The weight of the collector is enough to hold it firmly in place and create a tight seal.

Large chips are collected in the trash can (not included), and fine dust is captured in the cartridge filter before the air is recirculated into the shop (see *How it Works*, at left).

You might think that the small filter will require constant cleaning, but that isn't the case. The efficiency of two-stage dust collection, and the surprisingly large filter area inside the cartridge mean you'll only need to clean the filter after every third or fourth time you empty the trash can.

The one drawback to this unit is having to lift the heavy, awkward collector off of the trash can each time you empty it.

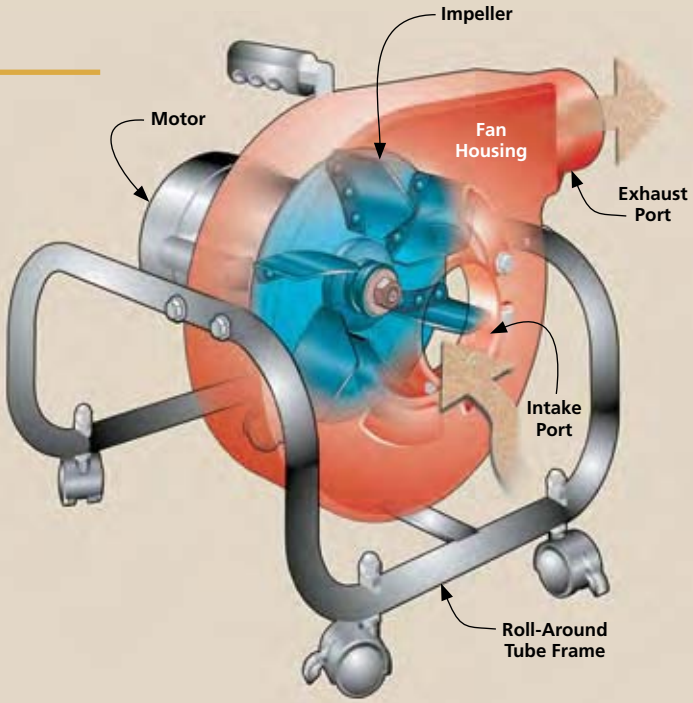
Compact Portable

This is the most affordable type of dust collector available. Not surprisingly, its effectiveness is limited. In fact, this type of collector offers more in the way of convenience than it does in effective dust collection. You won't have to sweep your shop as often, but don't count on this unit to maintain a safe level of air quality.

The bag shown here is rated for 1-micron, which is finer than the bags of most similarly sized units. But even at this level, airborne dust escaping through the bag is a real concern.

Because these units are designed to be compact, impeller size is restricted compared to the larger models. The result is a steeper decline in the performance curve as pressure is increased. For that reason, these collectors are intended to be connected directly to a single tool.

The size of the bag also limits the usefulness of this collector. A planer or jointer will fill the bag too quickly to make the unit particularly useful. Nonetheless, for under $200, these units do have their place in the small shop.



▲ ***How it Works.*** *Both heavy chips and fine dust are drawn directly through the impeller. A single bag functions as both chip collector and dust filter on units such as this.*

▲ *Although often configured as a central system, as shown here, cyclones can be used as portable systems.*

CYCLONE
TWO-STAGE WITH A TWIST

Cyclone dust collectors are inarguably the best dust collection system you can install in your shop. Their superior performance and their name come from the cyclonic action illustrated in *How it Works* on page 8.

The efficient separation of dust from air means the impeller in a cyclone collector can be designed to generate maximum airflow without consideration for sustaining impact from flying wood chips. This gives cyclones a much better performance curve and makes them highly effective even when connected to an elaborate system of ductwork.

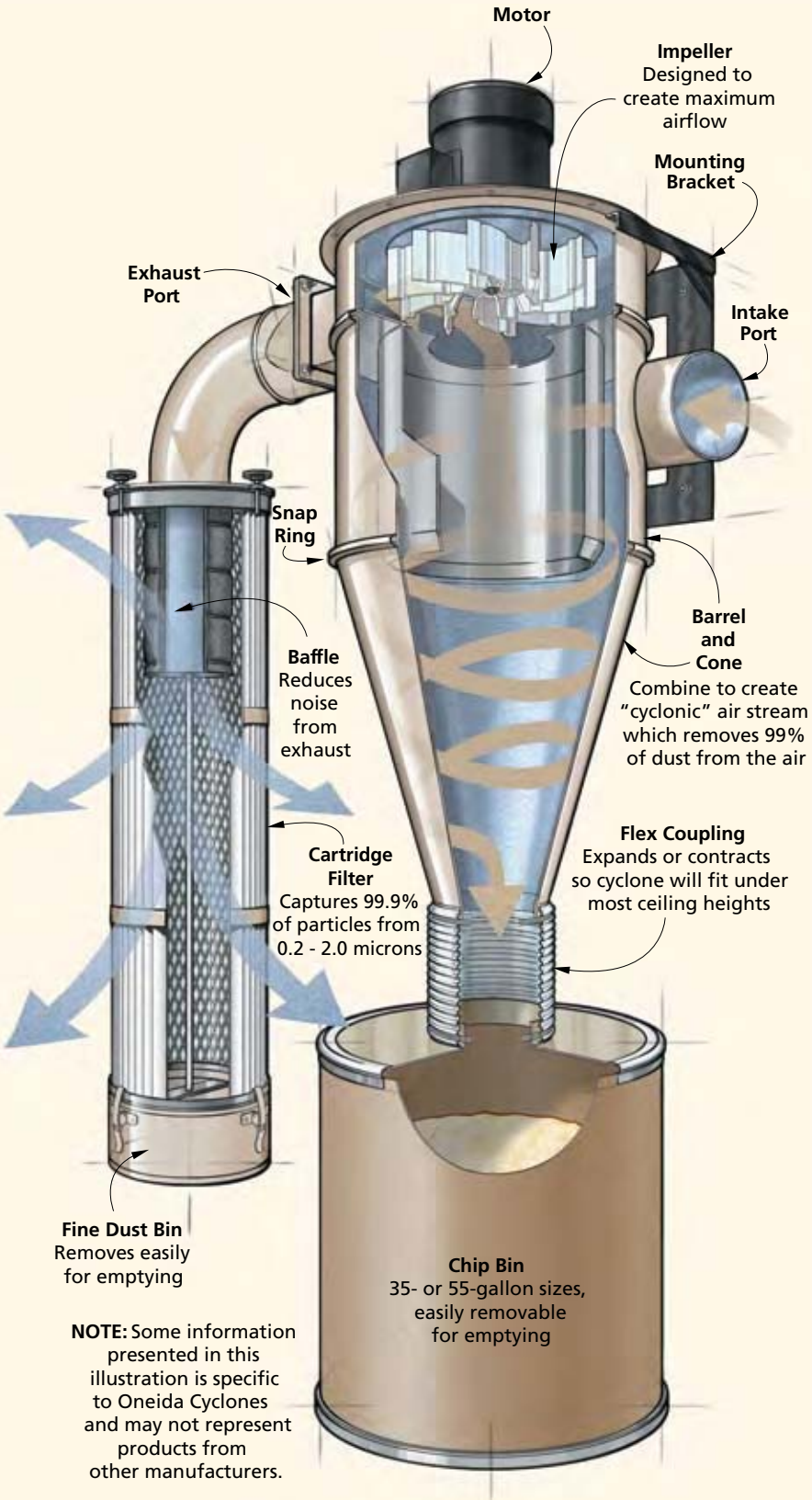
Filtration can vary between manufacturers. The Oneida shown here uses a pleated cartridge filter that captures 99.9% of dust particles down to .2 microns.

Clearly there is no need and no means to improve the performance of a cyclone collector with add-ons. You can, however, choose between an internal filter (see page 8) or an external filter (see photo above and illustration on page 8).

There is little in the way of performance difference between these two options.The real differences are space utilization (the external filter takes up a lot of room) and convenience (cleaning the internal filter means taking the cyclone apart — see Oneida's tip for easy reassembly in the box on page 8). Cleaning the external filter calls for blowing the pleats clean with an air hose and emptying the dust pan.

The cost of a cyclone, and the misperception that they must be used with a fully-plumbed system of ductwork, often lead home shop users to consider less costly (and less effective) means of dust control.

Contrary to popular belief, cyclone collectors do not have to be connected to a complete system of ductwork to be useful. An economical way to get started with a cyclone is to mount the unit on a mobile stand (available from Oneida) and use it just as you would a portable single-stage collector. As budget allows, you can add ductwork and blast gates a little at a time.



▲ ***How It Works.*** *Debris enters the barrel and is separated in a "cyclonic" stream of air. Large dust particles and chips fall into the bin and finer dust is trapped in the cartridge filter.*

CLEANING AND REPLACING INTERNAL CYCLONE FILTERS

To save space, Oneida cyclones can be configured with an internal filter. The trade-off is that you must remove the metal cone of the cyclone to access and clean the filter. The real trick, though, is getting the cone back on. Oneida offers this advice.

◀ ***Internal Filter Removal.*** *Disconnect the cone and move it aside while you remove the internal filter for cleaning (Fig. 1). Once removed, blow the pleated filter clean with compressed air.*

▲ ***Using Suction to Connect.*** *To reattach the cone after installing the clean filter, first make sure all of the blast gates are closed. Then turn the cyclone on and let the suction draw the cone tight against the barrel (Fig. 2). The suction will hold the cone tight against the bottom of the barrel and allow you to use both hands to reattach the snap ring (Fig. 3).*