

# Dust Collection Tips and Tricks

**By Chris Yato**

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For many of us, fabrication is the most enjoyable part of a mobile electronics' installation project. Whether it's creating a custom subwoofer enclosure, head unit trim piece or fiberglass beauty panel, the creativity aspect is clearly one of the perks of the job. Unfortunately, all of these projects can create a large amount of unhealthy dust that we must deal with in order to create our masterpieces. Dust and messy work areas are a common problem.

## Trial and Error

Due to the poor performance of most commercially available dust collectors, many installation technicians and store owners think of dust collection as an option and believe having MDF, fiberglass and body filler dust floating around the shop is unavoidable. But, what can you do about it? That's the question I used to ponder as I spent countless hours experimenting and trying to create dust collection contraptions that were average (at best), until I came across Bill Pentz's dust collection [website](#). Bill's [website](#) contains a wealth of honest information on dust collection that can't be found anywhere else, relating to small shop fine dust collection. In this article, I would like to share my experiences on how we have implemented a very comprehensive dust collection system at our retail store ([Competition Soundworks](#) in Artesia, CA.) and how you can avoid some unnecessary trial and error when it comes to reconsidering your dust collection strategy in your own shops.

## Benefits of Dust Collection

First, dust collection is very important. Not only for safety and health benefits, but because it helps create a clean and efficient work environment. Installation technicians and fabricators that spend time and money on keeping up with the latest installation techniques and tools should also invest in ways to work smarter. Working smarter (and safer) includes improving the shop layout and dust collection. They are both equally important to increasing efficiency and making a profit. Whether you are an owner, a shop manager, or even in the trenches working in the shop eight or more hours per day, removing the obstacles of airborne dust are important to your bottom line! In a professional shop, comprehensive dust collection is not a luxury, it's a necessity.

Rethinking dust collection may not seem like much of a way to increase efficiency at first glance. Looking at it from a purely productive viewpoint, it allows the unpleasant aspects of custom fabrication (routing MDF, grinding fiberglass, and sanding body fillers and primers) to be much more tolerable processes that are less likely to be put off. On the other hand, looking at it from a health and safety viewpoint, very fine dust created with these processes is very unhealthy and prolonged exposure can cause many respiratory illnesses down the road. From the shop maintenance viewpoint, this dust also seems to travel everywhere, even in shops that employ some form of dust collection. Clearly this makes both the shop owners and technicians unhappy and makes for lengthy, detailed clean up procedures or worse yet, no clean up regimen at all.

## Capturing the Dust Effectively

Wearing a dust mask to protect your respiratory health is one way to deal with the health side of the dust issue, but still leaves much to be desired in comfort and the overall appearance of the shop because a large amount of dust is tracked from the woodshop to other parts of the shop. Examine your own shop for a moment. How many customer vehicles are covered in dust during even a modest job at your shop? How many minutes do you spend with an air hose blowing off yourself and vehicles (only to re-circulate the dust)?

Capturing the dust at the source **where it is created** is one of the most important steps in fighting a dusty shop. In order to do this, the ducting that carries the dust from the machine to the dust collector must be the proper size. Although 4" round pipe/hose is the most common industry ducting size for dust collection, Bill's research has shown that 4" pipe is too restrictive to maintain

the proper airflow (700 to 800 cubic feet/minute) needed to capture fine dust at the larger dust creating machines like the table saw, miter saw and inverted router. Following Bill's suggestions, I upgraded our shop's ducting to 6" PVC pipe, with large radius bends at the corners (instead of 90° elbows), which resulted in a dramatic increase in suction at the source because the cross sectional area of 6" ducting is over twice that of 4" duct. The resistance to air movement of smaller diameter ducting is the same reason you would use 6" pipe rather than 4" pipe to port a large subwoofer.



*All of the machinery was fitted with 6" diameter hose instead of the usual 4" hose. This increased the effectiveness of the suction drastically! Shown here is a router table cabinet. Notice the angled panel to help move the dust to the opening naturally.*



*Even though our router tables are custom built units, a shop can still make commercially available tables effective by enclosing the space below the router so an effective vacuum chamber is created. If you feel the suction through the router throat plate, you know it's working!*



*Gradual bends in the collection tubing will reduce the resistance to air flow and make the suction more effective. Shown here is the distribution box for the suction tubing into each router table cabinet's blast gate.*

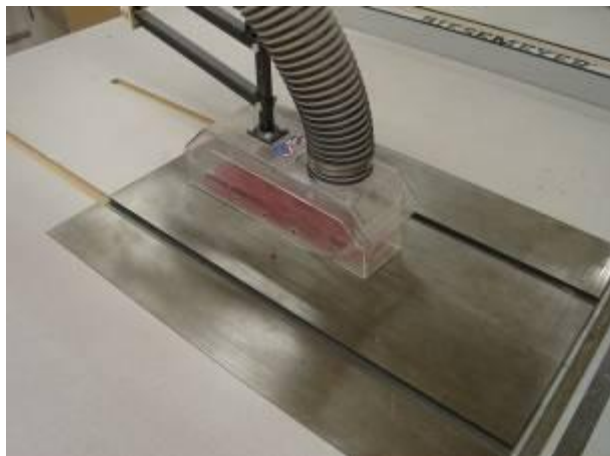
We also took steps to capture dust from the top of some machines (in addition to the standard collection point on the bottom or in the cabinet). The inverted router table and table saw are examples of where doing this further increased the effectiveness of capturing stray dust particles. By opening only the appropriate blast gates of the tools in operation, the suction of the dust collector is kept at maximum.



*By attaching a table top collection hose that I made, we were able to increase the amount of dust captured at the source. In this example, we have a flexible hose connected to a dust port placed right on the edge of the router table working space. It works beautifully!*



*This is a detailed view of the dust collection port and the hose attachment for the router table.*



*This is a detailed view of the dust collection attachment for the table saw. Most of the key table saw manufacturers have optional attachments like this.*



*For general rough cutting we have a rough cut table where the scrap just drops right into the bin. There's a dust collection grid sandwiched between two layers of ¾" MDF and it works very effectively at keeping most of the residual dust out of the air.*

### **Dust Collector or Dust Pump?**

While I was happy to see that the 6" ducting was doing a great job of capturing dust from our table saw and inverted router station, I also noticed that a considerable amount of dust was still covering all areas of the woodshop. As it turns out, most commercially available dust collectors (with cloth filter bags) actually act as a "dust pump" sucking dust from the source, then pumping the finest dust back out through the filter bags. Cloth filter bags are not a good idea for situations where the dust collector is in the same room where the dust is being collected, which is usually the case in mobile electronic installation shops. The bags are very porous in relation to the size of the fine MDF dust particles that we create and pass a large amount of the finest and unhealthiest dust back into the air. The only point in time when the cloth filters start to filter some fine dust is when they start clogging up, which impedes airflow and restricts suction at the machine. Some commercial dust collectors have incorporated 0.5 micron filters into their designs, but run into the problem of clogging up even more quickly than the cloth filters. The problem creates a real "Catch-22." When the bag type dust collectors are at maximum suction, they are leaking small particles (pumping them back into the shop). When the filters or bags clog enough not to leak, you lose critical suction on the system so dust just goes airborne right at the source.

### **The Cyclone Solution**

The solution to the Catch-22 of regular single-stage dust collectors is to incorporate a "cyclone" system that spins the coarser dust and debris into a container before reaching the filters. Unfortunately, most cyclone designs that are marketed towards consumers as "wood dust cyclones" are not effective for separating fine MDF dust and quickly clog up the filters, which is why Bill Pentz's research on cyclone design is so important to us. His unique cyclone design separates over 95 percent of the dust and debris before it reaches the filters, leaving less than 5 percent of the dust up to the filters. This allows the filters to work effectively for a very long time before they need cleaning. Pieces of debris are spun and dropped into a dust bin, never making contact with the impeller (fan) blades, which is an added safety bonus of cyclone separation. Thanks to Bill's hard work and research, an affordable solution is now available to help combat the dust problem that plagues car audio shops across the country. Many of these same tips are part of the [MECP Master Installation Technician study guide](#).

[Clear Vue Cyclones](#) is a company that builds affordable dust collection cyclones that are made to Bill's specifications using a durable 1/8" clear PETG plastic. They have a great video clip in their "Videos" section that demonstrates the principle of cyclone separation. I have been very happy with the long-term performance of our unit since purchasing and installing it well over a year ago. Many of our industry's top fabricators have visited our shop and have been impressed by performance of the system.



*Here are a couple of examples of the Clear Vue cyclone systems. The motor needs to solidly attach to a wall and then the cyclone simply pushes all the dust into the collection bin. Fine particle filtering should be utilized if the unit is not vented outdoors such as the one on the left.*

### **Easy as Taking Out the Trash!**

My favorite aspect of the system is that emptying the dust bin is as simple as throwing out a trash bag (full of dust) and replacing it with a new bag, which is a nearly dust-free process. This is in great contrast to the messy job of “shaking” the dust out of the cloth filter bags into a trash can, then dumping the dust into a trash dumpster, which usually sends clouds of dust into the shop and the air. With the cyclone system, keeping the shop clean and emptying the dust collector is really no problem at all. Because it’s easy, it’s a job that doesn’t get put off and it can be shared among all the technicians (or done on a rotating basis). The point is that it’s not a major inconvenience or health hazard just to empty the dust collection container!

### **Conclusion**

With this information, I hope to show that there is clean air at the end of the tunnel and that we all can take steps to improve our dust collection systems, not only for cleanliness, but for our health and efficiency too. With a combination of the proper ducting diameter, a big enough motor and vacuum capacity, the cyclonic collection/separation, and proper fine particle filtering, your shop can be clean enough to present to customers at any time. A clean and presentable workshop will add value and definitely increase your ability to capture better rates for the great work you are probably already doing!

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