

## **Design and Build your own dust collection system**

"If you are using tools to sand or chop then you are creating dust and debris every time you touch a tool to wood"

A typical shop consists of several different work stations. Areas around stationary machinery and around work benches tend to be where wood debris accumulates.

Although wood debris and dust are standard in every wood shop a dust collection system isn't. Consisting of large chunks and strips all the way down to dust particles. Managing this debris is important and there are many ways to remove it.

- Remove debris with a broom or shop vacuum.
- Have dust collection systems at each work station.
- Where dust masks to filter particles
- Use fans and open doors or windows to vent your shop.
- Or you can simple ignore it and do nothing.

There are very few shops that are completely clean and free of dust and debris. Although almost every wood worker cleans up using a broom and dust pan but not nearly as many consider the dust and suspended particles that a broom can't remove (and often actually adds more to the air).

There have been studies recently stating the [harmful or toxic affects](#) wood dust can have. Some woods like satinwood are classified as a primary irritant while other are considered sensitizers due to the effect over extended period of time.

Aside from natural toxins wood workers need to worry about pesticides and preservatives. Most wood is labeled as being treated but some exotic wood is difficult to determine if it has been treated in any way.

View alphabetical list of wood species and health hazards each species can have.

## Dust Collection Basics

Dust collection and air filtration systems should be considered when building any wood shop. It is best if the entire system can be integrated into the shop design but this can be difficult if you are installing a system into an existing shop without totally remodeling.

### Components

A central dust collection system consists of a central collection unit and ducting leading out to each machine in your shop. There are several accessories to go with your system, some are necessary others aren't.

Ductwork is usually galvanized straight pipe, 4" - 6" in diameter. It is recommended that you use 26 - 24 gauge pipe.

Plastic can be used but there are some special design features that need to be implemented. Features like:

- Pipe needs a ground wire run inside of it.
- The pipe should also have a ground wire wrapped around the outside of it.

### Safety Note:

It is very important to ground the ducting of your dust collection system against static electricity. Metal ducting is much simpler than plastic or PVC simply because all you need to do is ground both ends of the ducting. Plastic or PVC needs a ground wire run inside the pipe and wrapped around the outside as well.

***Failure to take these precautions can lead to a nasty shock or worse, a fire.***

### Terminology

It is **important** to understand the technical terms associated with a dust collection system.

- **Static Pressure (SP):** Is the resistance (or friction) caused by the air inside the duct. Units are measured in "**Inches of water**".
- **Cubic Feet per Minute (CFM):** The volume of air moved in 1 minute.
- **Feet per minute (FPM):** The velocity or speed of the air within the duct.
- **dBA:** Measure of the relative sound intensity. 0 dBA is barely audible while 130 dBA is considered painful.
- **Micron:** Is a unit describing the size of a dust particle in this case.  
1 micron = 0.001mm

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## Steps for building your own dust collection system

Special consideration needs to be given to:

- Traffic flow: You want to avoid having ductwork running through high traffic areas or in areas where it may affect the safe operation of power tools.

It is important to the performance of the dust collection system that the ducting doesn't get dented or crimped. This reduces air flow and may lead to blockages.

- Ductwork arrangement of stationary tools: Especially true with a table saw. It is difficult to duct a table saw upwards. The ducting rising up to the ceiling could be a hazard to the safe operation of the tool.

This is where you will need to find another route for the ducting. If you have a crawl space then that is the most practical method.

- Location of stationary tools: It is important to keep your distances (runs) from the tools to the dust collection unit at a minimum.

If one tool is unnecessarily far from the dust collection unit then it may result in a larger unit to service that run. Move tools if possible to reduce the length of runs.

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### Step 1. Determine your needs

Depending on what size of wood shop you have or the number of tools you want to add to your dust collection system, you will need to have a system that will accommodate your needs.

[You may be able to have a portable system that only services one tool at a time.](#) This is the perfect solution for a small shop and certainly the least expensive.

### Step 2. Gather information

[Magazines, books, articles](#) and the internet are all great places to start gathering information on dust collection. You want to gather information on

collectors and filters, duct work, flexible hose, filter bags, remote on/off switches and grounding kits. Chart the results of your information gathering and compare.

**Step 2. Be sure to adhere to all local building codes**

Some areas have codes dictating where a dust collection unit may be located or how loud it can be. Checking to be sure there are no codes or bylaws before you build your dust collection system may save you money and time.

**Step 3. Laying out your system**

First draw a layout for your shop. **Show locations of all tools** that you intend to hook up to your system. Locate the collector on this drawing as well.

Determine the lengths of the ductwork and the number of fittings. Keep in mind that the smoothness of the duct interior and the number of fittings. These all effect the flow and **could increase the size of your dust collection unit.**

When making the transition between larger and smaller diameters use tapered connectors to avoid restricting the flow.

Remember to keep it simple. For most small shops a basic system will work just fine. Having 3 fixed outlets dedicated to the tools you use regularly and flexible hose for those that are only used occasionally.

Most dust collection units have 2 in-ports for 2 runs of hose. This will easily accommodate 4 stations especially if only used one at a time.

A dust collection system collects the large shavings and smaller particles but is limited in eliminating very small particles The filter bags are limited when it comes to dust smaller than 10 microns unless you get a dust bag that is designed to capture smaller particles.

[The alternative which has other benefits is to get an air filter to "clean" the air in your shop.](#) This is

**Air Flow for Various Machines**

Machine	CFM
Table Saw	300-350
Band Saw	400-700
Disc Sander	300-350
Jointer	350-440
Planer	400-785
Shaper	300-1400
Lathe	350-500

**CFM Required for Duct Diameter**

Duct Diameter	CFM (@3500FPM)
3"	170
4"	300
5"	475

**SP by Duct Diameter (3500 FPM per 100' of Duct)**

Duct Diameter	Inches of SP
3"	7.5
4"	5.5
5"	4.2
6"	3.5

effective in also ridding the air of chemical pollutants from paint, polyurethane and mineral spirits.