



Wood dust collection system design and inspection

The hazards of wood dust

Wood dust emitted from sawing, planing, sanding, and other operations can cause a variety of health effects when inhaled. Depending on the type of wood used, the effects can range from allergies to nasal cancer.

Wood dust is also flammable and combustible. Fine dust accumulations may explode if an ignition source (e.g., open flame, friction, or sparks) is present.

A dust collection system can reduce the risks

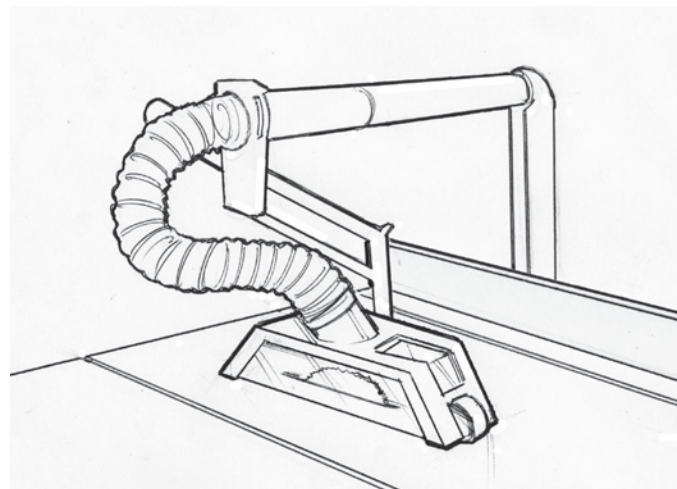
A properly designed wood dust collection system will reduce worker exposure and help prevent accumulations of dust around operating equipment. A typical system consists of a capture hood, a fan, ducting, and a filter.

Dust collection systems can be purchased or designed and constructed for a particular operation or piece of equipment. Equipment suppliers can provide some guidance. However, a professional mechanical engineer (P.Eng.) who specializes in dust control systems can ensure that a system is properly designed for a particular operation to maximize efficiency and safety.

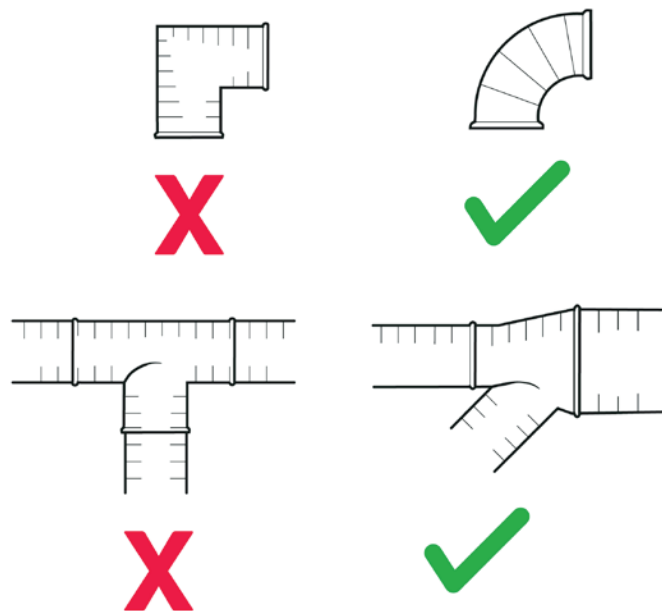
Ensuring a collection system works well

The following recommendations can help ensure that a wood dust collection system works efficiently:

- Place the collection hood as close as possible to the point of dust generation.
- Ensure that the hood encloses the dust-producing operation as much as possible and does not interfere with the process.
- Position the collection hood to take advantage of any inertia the dust might have (e.g., on the bottom of a saw blade designed to cut on the downstroke).
- Minimize the length of ducting used and avoid sharp bends or connections.



Dust collection system for a table saw



Avoid sharp bends or connections in ducting

An efficient dust collection system will help ensure that money spent on equipment and power is not wasted. It will also make the workplace cleaner and healthier, and it can help produce a better product.

For more information

A good reference for anyone who regularly designs, uses, or maintains wood dust collection systems is *Industrial Ventilation: A Manual of Recommended Practice*, published by the American Conference of Governmental

Industrial Hygienists (ACGIH). The manual contains many good diagrams of common wood dust collection hoods that can be used for a variety of processes and pieces of equipment.

Inspection checklist

Once a wood dust collection system is up and running, regular inspections of the system need to be conducted. The following checklist lists some of the things that should be considered when inspecting a collection system.

Description	Not applicable	Yes / Good condition	No / Needs repair	Comments
Records				
Manuals are made available to anyone who uses or maintains the system.				
The system is balanced regularly, and balancing reports are kept.				
Records of regular inspections and maintenance are kept.				
Collection hood				
The hood is placed as close to the point of dust generation as possible.				
The area around the hood is enclosed as much as possible.				This will help to ensure that as much of the dust as possible is collected.
The hood is placed to capture dust in its ejection path.				Think of a collection hood working like a baseball glove capturing a ball. The ball acts like fast-moving particulate. To capture the ball, you want to place your glove in line with the natural path of the ball.
Ducting				
Round, smooth bore (not corrugated) metal ducting is used.				PVC or synthetic ducting/pipe should not be used because it increases the risk of static electricity.
Ducting is grounded.				
Ducting is in good condition, free from leaks, significant corrosion, and visible damage.				
The air velocity inside the main duct is at least 20 metres per second (4,000 feet per minute) and 23 m/s (4,500 fpm) for heavier dust.				
The velocity in the main duct is higher than in the branches.				The air velocity should be at least 23 m/s (4,500 fpm) in the main horizontal ducting and about 21 m/s (4,200 fpm) in the branches.
The radius of any bend in a duct is at least 1.5 times the duct diameter.				
Flex duct length is minimized at connection points to the hood and/or collector.				Ideally, flex duct length should be less than 60 centimetres (2 feet).

Description	Not applicable	Yes / Good condition	No / Needs repair	Comments
Ducting (continued)				
Ducting is free from accumulations of dust and debris.				Having access and inspection points in the duct is the best way to confirm the absence of accumulated material. Alternatively, tapping on the side of the duct may indicate accumulated material is sitting on the bottom (if the sound from the tapping doesn't carry). In this case, the ducting may need to be cleaned. Before tapping the duct, make sure there are no accumulations of dust on top of it.
At least five duct diameters of straight ducting are present before it enters the fan housing.				This might help to maximize the efficiency of the fan up to 25 percent.
Blast gates are used to balance the ventilation system.				Mark the location of the blast gate knives directly on the blast gates to allow for quick rebalancing of the system if necessary.
All duct hangers are in good condition and free from visible damage or corrosion.				
Dust collector				
You have considered installing inline pressure monitors before any hoods and just before the dust collector.				Pressure monitors will help you verify that your system is working as expected. A sudden increase in pressure might mean it is time to change a filter or unclog a duct. Similarly, a drop in pressure may mean a tear in a filter or a hole in a duct.
Dust from hardwood and allergenic softwood is not recirculated.				You can only recirculate ventilation system dust from hardwood and allergenic softwood if you have written approval from WorkSafeBC.
If the dust collector recirculates discharge air, you are using a filter with the highest dust-collection efficiency possible.				Wood dust is an as low as reasonably achievable (ALARA) substance. Dust levels must be kept as low as possible.
Return air from cyclones is filtered before entering the workplace.				
Dust collector components are free of corrosion.				
You have considered installing fabric filter differential pressure (DP) monitors.				DP should be monitored daily, as it is the first indication that <ul style="list-style-type: none"> • The dust collector is plugging and resulting in lower dust capture or <ul style="list-style-type: none"> • The filter fabric is damaged or becoming loose
The filter fabric is in good condition with no visible rips or tears.				
The reconditioning system is working.				
Bags are emptied of dust regularly to avoid buildup.				
The explosion vents are in good condition and clear of debris.				

Description	Not applicable	Yes / Good condition	No / Needs repair	Comments
Dust collector (continued)				
The spaces around doors, enclosures, and clamps are properly sealed (i.e., air does not leak out).				
All motors and pulleys are in good condition and free from accumulated dust and debris.				
Fans and pulley systems are working properly with no unusual noise or vibration.				
Fan blades are free from accumulated debris.				
The fan housing and blades are free of damage.				Damage may indicate that something other than wood dust is being picked up.
The fan is running in the right direction.				Fans can be connected backward, reducing their effectiveness.
All guards are in place and in good condition around moving parts.				
Maintenance/monitoring				
The process is monitored to see if the dust is being captured by the hood.				
Ducts are checked for damage at least once per week.				
Collection hoods are checked for airflow at least once per week. You have ensured that woodworking equipment has been locked out. Capture velocity at the point of dust generation typically ranges from 5 m/s (1,000 fpm) to 10 m/s (2,000 fpm).				If you do not have an anemometer (a device used to measure airflow), try taking a pinch of wood dust and letting it fall near the point of dust generation. If most of the dust falls directly onto the ground without being drawn into your hood, you probably do not have enough airflow.