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Although the design and selection of a dust collection system is best left to a professional designer or engineer, a basic knowledge of how these systems are put together will help to ensure that shop owners and managers get a system that is properly suited to meet the needs of their company.

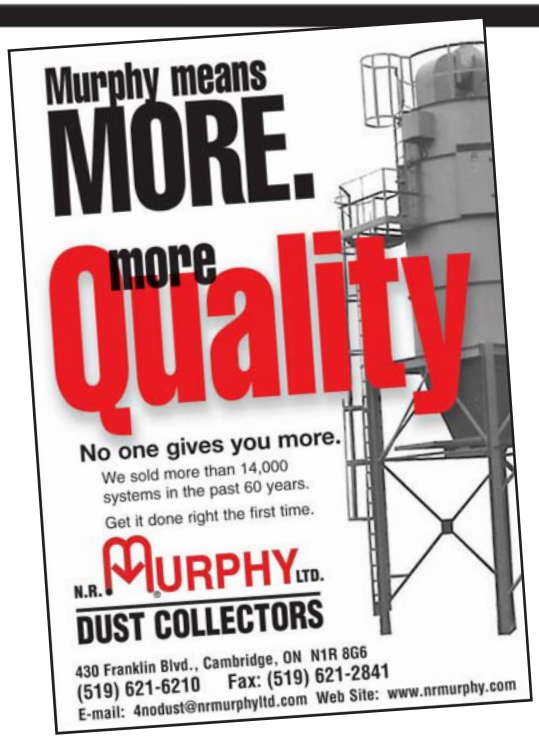
There are many factors to consider when determining the correct size and configuration of a dust collection system. How many dust-producing machines will be on the system? What is the dust collection pickup size on each machine? Are there any plant layout and dust collector location issues? What type and weight of material will be collected? How much waste is anticipated? Is there a preferred method of material disposal, such as drums, rotary airlock or truck disposal? Which type should be considered, shaker-style or continuous cleaning? (Hours of operation may determine this.)

When designing the dust collection system, **the first step is to produce a list of dust-producing equipment.** Prepare a scaled drawing of the plant, identifying the location of all the machines that are to be connected to the system. From the list of machines, the total volume of air required for the system can be calculated. This is done by multiplying the area of all the pickup points, in square feet, by the velocity required to keep the material in suspension in the ductwork. This is normally 4,000 fpm (minimum 3,500 fpm) for most woodworking applications, but the weight and flow characteristics of the material being collected must also be taken into account when determining this number.

**Next, determine the location of the dust collector.** Bear in mind the accessibility of the location for both the initial installation, as well as for waste disposal vehicles, if applicable. Also consider whether the dust collector will be located inside or outside the facility.

Keep in mind that the National Fire Code of Canada restricts the size of collectors allowed inside plants to 1,000 cfm, unless additional steps are taken to provide explosion venting to the exterior of the plant. A recent change to the National Fire Protection Association's NFPA 664 standard, which addresses the prevention of fires and explosions in wood processing and woodworking facilities, also allows "enclosure-less type dust collectors" up to 5,000 cubic feet per minute (cfm) to be located inside plants, but restricts their placement within the plant and the types of dust-producing machines that can be connected to them. Always check with the local authorities, such as the Fire Marshal's Office or the Ministry of Labour, to determine the type of dust collector allowed in that jurisdiction before making a purchasing decision.

Using the scaled drawing, lay out the ducting so that each piece of machinery is connected to the dust collector through branch lines connected to the main duct. The branch lines and the main duct are sized by adding the equivalent areas of each dust collection pickup from the farthest point in the system to the dust collector. The main duct must be sized correctly to keep the material in suspension and should be stepped up using transitions as each piece of equipment or branch line is added to the system. The final size of the main duct will determine the size of the dust collection system exhaust fan.




This layout is then used to determine the static pressure of the total system. When combined with the cfm requirement for the system, the static pressure will be used to determine the horsepower required for the motor that drives the dust collector's exhaust fan. A typical system with medium-length duct runs will be in the neighbourhood of 12" to 14" wg.

**The next step is to determine the filter area required for the system.** This is done by using the appropriate airto- cloth ratio, based on the type and physical properties of the material being collected, as well as the duty cycle of the dust collector. A continuous-cleaning type dust collector can generally operate continuously at a higher air-to-cloth ratio than a shaker-style dust collector.

**We now have the basic requirements to determine the size of the dust collector:** the cfm; the static pressure of the system; the size of the main duct; and the square footage of filter for the dust collector.

This data, along with the requirements for waste storage/ disposal and accessories required by provincial and national codes, will determine the configuration and size of the dust collector.

Some initial work, using the above information, will make quote comparisons for dust collection systems a little easier to break down, and should allow plant owners and managers to make a more informed decision as to the suitability of the equipment for their particular operation.

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## Tips

When laying out equipment in a new facility, try to locate larger pieces of machinery farther away from, and smaller machines closer to, the dust collector. This will tend to keep the horsepower required for the dust collector fan down.

Never buy a dust collector based on the horsepower of the fan alone, as this can be deceptive.

Make sure the dust collector meets all the applicable codes and regulations in the municipality where it is to be located.

Deal with a reputable company that has the expertise to do a proper dust collection system design and is capable of providing the equipment required.



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