What are some tips for reducing my dust collection system's energy consumption?

Make sure you’re performing regular preventive maintenance of the dust collection valves and cleaning system to maintain system pressures, as well as consistently changing filters to sustain normal pressure drops. Monitor your system controls and pressures to ensure that the equipment operates as it should. Also, inspect any gaskets, seals, doors, and other components for leaks or bypass.

Chris Kennington, president, Air Filters & Equipment, 803-282-9190

Here are several relatively straightforward ways to improve your system’s energy efficiency:

- Perform routine maintenance on your dust collector and ductwork, minimizing air leakage around flanges, gaskets, seals, and rotary valves.
- Perform routine maintenance on your fan, including checking for proper belt tightness and bearing lubrication as well as fan and motor shaft alignment.
- If you’re using a pulse-jet dust collector that cleans the bags on a timed basis, change to an on-demand pulse down system. Instead of pulsing down at pre-specified intervals that can be unnecessary and wasteful, your system will only pulse down when it achieves a maximum static pressure reading and will only pulse down to a certain minimum.

John Dauber, North American sales manager, Camfil Farr APC, 800-479-6801

One of the ways to reduce energy consumption is through the use of a variable-frequency drive to control the dust collector fan speed. This electrical control is highly efficient in maintaining desired airflow through the collector, and energy use is greatly decreased with a typical return on investment of less than 1 year. By helping reduce the spike in overall energy consumption, use of a variable-frequency drive may also lower your utility rate. The simultaneous use of a premium-efficiency fan motor, which is designed for cooler operation and more efficient performance, can result in further savings.

The filter media you select can also impact energy consumption. Open-pleat cartridges allow better airflow through the filter for reduced pressure drop and energy use. Open-pleat filters also respond better to pulse cleaning and use less compressed air, saving even more energy.

Michael Gerardi, general manager, Scientific Dust Collectors, 708-597-7090

There are some potential changes that may save your system energy:

- Make sure the filter cleaning system is functioning correctly and using the least amount of compressed air to clean the entire filter and maintain a low pressure drop.
- Upgrade to cleaning by pressure drop instead of time, where appropriate, if the collector can handle the loading.
- Consider adding a variable-frequency drive to the fan motor to more accurately adjust airflow. If that’s not practical or within budget, consider using a fan outlet damper to adjust airflow.
- Most important, balance the dust system using blast gates where appropriate. Have a professional visit and check velocity and flowrates so that the least amount of brake horsepower (energy) is used to achieve good dust collection.

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The two primary sources of energy consumption on dust collection equipment are the fan or blower horsepower consumption and the use of compressed air for a dust collector filter cleaning system.

The required fan horsepower can be reduced by lowering the overall system static pressure requirement through more efficient duct design or improved fan system effect on the inlet and discharge. Replacing manual dampers with a variable-frequency drive that maintains a constant flow can also provide significant power savings.

Compressed-air consumption can be reduced by using an on-demand pulse-cleaning controller that initiates filter cleaning only when indicated by filter pressure drop. Improving cleaning effectiveness by using your supplier’s recommended pressure, keeping the compressed air clean and dry, and allowing sufficient time for the manifold to refill will also decrease the required cleaning cycle frequency. Also, make sure the diaphragm valves and solenoids are functioning properly and that they aren’t partially opening or staying partially open, which will result in depleting compressed air.

The most significant way to reduce energy consumption is to use filter media technology that reduces the dust collector’s operating pressure drop and significantly improves pulse-cleaning effectiveness. The surface layer used on nanofiber filter technology keeps the dust on the surface, allowing it to be easily released from the filter during cleaning, which requires less frequent pulse cleaning and reduces compressed-air use. More effective cleaning also allows the system to operate at a lower static pressure, reducing horsepower requirements.