Q. WHAT ARE THE MAJOR COSTS INVOLVED WITH METAL DUST COLLECTION?
When evaluating the costs of operating cartridge-style dust collectors, most companies put too much weight on the equipment’s purchase price. However, since dust collectors last 20 to 30 years, other costs become much more significant over time such as energy usage and consumables. Evaluating the total cost of ownership (TCO), including electricity, compressed air usage, and ongoing expenses associated with filter cartridges, will provide a more accurate estimate.

Q. WHAT ARE THE MAIN WAYS DUST COLLECTORS USE ENERGY?
Dust collectors consume electrical energy the whole time they are running, but the largest portion of the electrical load goes to the fan motor that moves the air through the system. Also, a lot of energy is used to heat or cool the air that replaces the air that dust collection systems constantly suck out of the plant or facility they are cleaning.

Q. CAN AIRFLOW BE ADJUSTED MANUALLY TO SAVE ENERGY?
Yes. Dust collectors typically have a damper at the outlet of the fan motor, which can be used to mechanically alter the airflow and static pressure. When the filters are new, you can close the damper more to achieve the desired airflow. As the filters become dirty, you
can open the damper more to increase airflow. However, this is time-consuming and depends on operator diligence.

Q. WHAT IS A VARIABLE FREQUENCY DRIVE (VFD), AND HOW DOES IT AFFECT OPERATION COSTS?
A VFD is an electrical device that electrically controls the fan speed. It automatically manipulates the frequency and power consumption supplied to the fan motor, so human interaction is no longer required. The VFD will automatically sense changes in airflow and pressure drop, and will adjust the fan speed to return the system to optimal airflow.

Q. HOW MUCH ENERGY CAN BE SAVED BY USING A VFD?
VFDs achieve significant electrical savings over the long term because the amount of energy needed to operate the fan motor varies with speed. With a VFD, the fan draws only the amount of power required for the specific fan speed. For example, a fan that runs 25% slower would use 42% of the power that would be required for full speed. The same fan running 50% slower would use 12% of the full-speed power. VFDs enable users to save an average of 30% on their energy costs to operate the dust collector. Also, maintenance and operation costs are reduced because fan speed adjustments don’t require human intervention.

Q. HOW MUCH DO VFDS COST?
Variable frequency drives generally cost $11,000 to purchase and install. However, since they save over $12,000 per year in energy, they pay for themselves in under a year.

Q. DO DIFFERENT DUST COLLECTORS USE DIFFERENT AMOUNTS OF COMPRESSED AIR?
Most modern dust collectors require pulse cleaning to maintain a steady airflow, which is measured in cubic feet per minute (CFM), and to run at peak efficiency. When the pressure drop reaches a certain level, pulse cleaning systems send quick bursts of compressed air back through the filters. However, producing compressed air is expensive, so it is worthwhile to get a dust collector that minimizes usage. Today’s most advanced dust collectors can reduce compressed air consumption by as much as 50% versus competing dust collectors. They use less compressed air because they are able to pulse clean far less often.

Q. HOW CAN SOME DUST COLLECTORS MAINTAIN THE REQUIRED AIRFLOW WHILE USING LESS COMPRESSED AIR?
When properly designed, a dust collector’s cleaning system will remove the built-up material from the filter cartridges, reduce the pressure drop across them, reduce the fan energy consumption, and in turn, reduce associated energy costs. They use high-efficiency filter cartridges that can handle higher airflows while maintaining a high level of filtration efficiency. Because of the pleating technology, each filter cartridge contains more usable media so they can move more air and process more dust. The cartridges are also fabricated with inner cones of additional pleated filter media that can evenly distribute the pulsed air along the outer pack of the filter and through the inner cone. With each pulse, more dust is ejected from the filters straight into the hopper. The result is a more thorough cleaning with each pulse, so the airflow remains unrestricted and the pressure drop remains low for a longer period of time. The cleaning system doesn’t have to pulse as often, providing a large savings on compressed air.

Q. HOW CAN I MINIMIZE THE HEATING AND AIR CONDITIONING COSTS IN MY FACILITY?
Dust collection systems move a lot of air from the plant or other manufacturing facility they are cleaning. Dust collectors generally take the inside dust-laden air, send it through the filters to remove the dust, and then expel it
Dust Collection

outside via ducting. When the inside air is heated or air conditioned, the facility's HVAC system has to work hard to continually replace the air that was removed. Facilities can reduce their energy usage by safely recirculating the cleaned air back into the workspace. However, this can’t be done safely without a filter on the return ducting that prevents the dust from re-entering the workspace if there is a leak in the primary filter system. A properly tested and documented integrated safety monitoring filter (iSMF) provides that function without using additional floor space. The iSMF also functions as a flame arrestor for combustible dust, making it safe for facilities handling combustible dust to recirculate their air.

Q. WHAT ARE THE MAJOR COSTS FOR CONSUMABLES I SHOULD CONSIDER?

Filter cartridges are a major cost consideration because they have to be continually replaced over the life of your collector. However, most facilities consider only the purchase price of the cartridges themselves and don’t consider the hidden costs. Since different collectors require different numbers of cartridges, be sure to add up the total number that will be required per year and their associated maintenance, transportation, downtime and disposal costs.

Q. HOW CAN I REDUCE THE COST OF REPLACEMENT FILTER CARTRIDGES?

First off, be sure to get a dust collector that is designed for your specific dust and application. That way you will have a collector that provides the required CFM with the minimum number of cartridges. For example, a Camfil Gold Series X-Flo GSX24 dust collector uses 24 filter cartridges to move 36,000 CFM of air, while other dust collector brands might require 32 cartridges to move the same volume of air. Also, premium filter cartridges generally last 50% longer than standard filters because they pulse clean more effectively. Though Camfil cartridges cost more per cartridge, you would likely need fewer of them during the year, reducing your overall filter costs. Because they are changed out less frequently, they have lower associated maintenance, transportation, downtime and disposal costs. Disposal costs can be significant, particularly if a hazardous material is being collected and the filters require incineration.

Q. DO ALL FILTER CARTRIDGES USE SIMILAR FILTER MEDIA?

No. Most premium filter cartridge brands can be constructed with standard media or specialty media for specific types of dust and/or specific applications. For example, certain applications may require media treated with coatings that promote dust release, flame retardance or conductivity. Using the wrong media can cause unsafe operating conditions, a combustible dust hazard, high pressure drop and excessive energy use. Using the correct media creates a safer, cleaner work environment with less dust collector maintenance.

Q. WHY IS MEDIA PLEATED BEFORE IT IS INSERTED INTO THE CARTRIDGE?

Media is pleated so that more fits in each cartridge, increasing the amount of media exposed to the airstream. In theory, more media means more dust can be collected, but that only holds true if the pleats stay open. With most standard filters, the pleats are packed so tightly that the air only reaches the outside edges. But premium filters like Camfil’s use synthetic beads to hold the pleats open, which exposes more media to the airstream, creating more media that is available to catch airborne dust particles. Independent tests of this technology versus standard pleating show that HemiPleat technology greatly enhances pulse cleaning. Filters capture more airborne dust particles and release more of those particles when pulsed, resulting in a more efficient system requiring less maintenance. HemiPleat technology provides the lowest initial pressure drop and the lowest pressure drop that lasts through the lifetime of the filter.

Q. HOW DOES A FILTER MONITORING SYSTEM REDUCE LABOR AND DOWNTIME?

When a dust collector vendor monitors their dust collectors remotely via sensors on the filtration system, they get alerts when high differential pressure set points are hit. That means they can alert customers so they can troubleshoot issues that they likely would not have noticed yet. For example, someone might have forgotten to turn on the cleaning system or the compressed air, so the filters haven’t been cleaning. These monitoring systems are good preventive maintenance tools that reduce overall downtime costs.

For more information, contact Camfil APC, (870) 933-8048, Camfilapc.com, filterman@camfil.com
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