Three Ways to Help Reduce Your Dust Collector's Energy Use

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Three Ways to Reduce Your Dust Collector's Energy Use

Advance your plant's sustainability goals by tracking your collector's energy use on emissions exhausting, fan speed, and filter life, through connected monitoring.

By Brent Nelson, Business Development Manager of IoT and Connected Solutions at Donaldson

Environmental stewardship is now a major global business priority. The influence of customers, employees, communities, suppliers, investors and governing organizations, such as the U.S. Environmental Protection Agency (EPA) and United Nations Global Compact, have driven companies to develop and implement new sustainability initiatives.

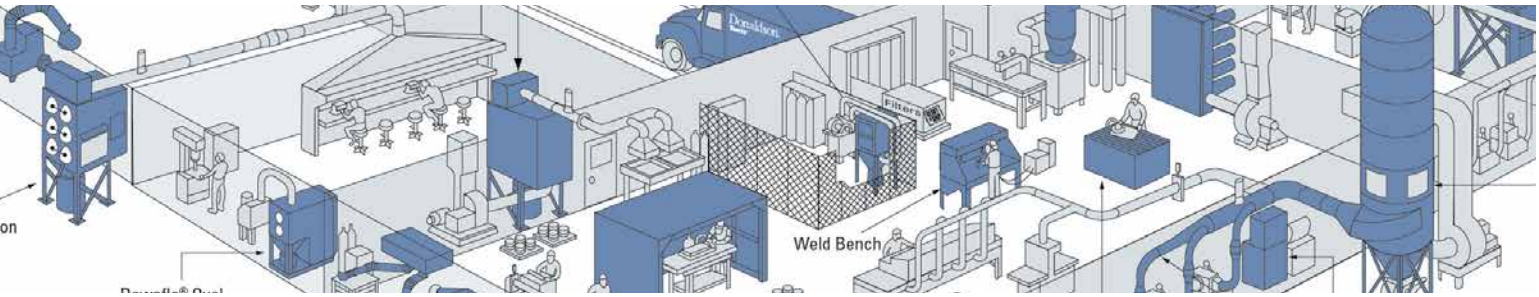
There's widespread recognition that manufacturing companies play an important role in helping preserve the environment. And those companies that are demonstrating a strong integration of sustainability initiatives into their business strategy, are not only setting an example, but also seeing bottom-line benefits.

80% of companies worldwide and more than 95% of the largest companies currently report sustainability initiative outcomes.

Corporate sustainability engineers and Environmental Health and Safety (EHS) professionals are increasingly being held accountable to specific key performance indicators (KPIs) to demonstrate successful program performance. According to a 2020 sustainability reporting survey* by KPMG, 80% of companies worldwide and more than 95% of the largest companies currently report sustainability initiative outcomes.

When it comes to tracking sustainability in the industrial manufacturing sector, reducing energy usage and greenhouse gas consumption are often key metrics. If your plant is not currently gathering energy usage data, the first steps are to define what areas to monitor and to establish baseline metrics or key performance indicators (KPIs).

* https://assets.kpmg/content/dam/kpmg/xx/pdf/2020/12/the-time-has-come-executive-summary.pdf



Starting Point

Begin by looking at individual processes and equipment in your plant, such as your dust collection system. Two significant contributors to dust collector energy consumption are the collector fan and the conditioning of air when emissions are exhausted outdoors.

Let's look closer at these two factors and propose potential solutions that could help your plant be more energy efficient and cost-effective.

1 Exhausting Emissions Inside vs. Outside

Every plant and application is different, so plant managers must decide if indoor or outdoor dust collection system exhausting is the right approach. For example, applications creating carcinogens or hazardous gases and substances must exhaust outside to help manage risks related to exposure, and possible contamination of machines and products.

If outdoor exhausting is not required for a specific application, facilities using efficient and reliable dust collection systems may benefit from exhausting emissions indoors and recirculating air inside. When a dust collector is configured to recirculate cool or heated air back through the plant, this recirculated air stays at or near the desired temperature, requiring less energy consumption than introducing new air which may need to be cooled or heated.

Processing plants in cold or warm climates are most impacted by outdoor emissions exhausting since the air supply frequently turns over and must be re-conditioned to the optimal temperature. This process takes a considerable amount of energy and could be avoided by filtering and recycling air internally.

Consider a Minnesota-based factory that heats its air during the winter months and has five, 10,000-cfm dust collectors on-site. The factory runs two shifts daily for six days a week and is able to save $126,000 in energy costs and 700-metric tons of greenhouse gas per year by exhausting their filtered emissions inside and recirculating the pre-conditioned air.

2 Using a Variable Frequency Drive

Dust collectors use electrical energy while they're running and the largest portion of the electrical load comes from the fan motor moving air through the filtration system.

It's important to set and watch fan airflow levels to maintain proper dust collection. If the airflow is too high when new filters are installed, the filters may prematurely rip or wear. When filters are older and airflow is too low, there may not be sufficient air velocity to capture dust from the collection point and it may encourage dust to settle in ducts or promote dust build up. Both scenarios may cause dust to accumulate in your factory and increase the total costs of your production process.

In many applications, the airflow level is critical to the quality of the process and end product. For example, too much airflow in stainless steel welding can pull shield gas away from welds, resulting in low quality seams, while too little airflow can expose operators to hazardous compounds.

The mechanical way to control dust collector airflow is to manually adjust an outlet damper on the collector's fan. This adjustment must be made properly and often since operating conditions may change over time. This manual process alone may not be reliable enough to make a measurable difference and can even waste energy since the damper creates additional static pressure that the fan may be required to overcome.

Many of these challenges can be mitigated by utilizing a variable frequency drive (VFD). The VFD monitors dust collection system parameters, such as velocity pressure in a duct or static pressure at the collector inlet – both of which can be directly tied to a desired operational parameter like volumetric flow rate. The VFD monitors the desired parameter and automatically adjusts airflow as conditions fluctuate. This allows the dust collection system to maintain a more desirable airflow even when filters start to collect particulates.

Most companies install a VFD expecting to reduce energy consumption, but it is also important to correctly maintain your filters. If you're running a dust collector with well-worn filters, a VFD may need to increase its power to maintain adequate airflow, which will in turn consume a higher amount of energy.

For example, differential pressure increases of only 4 inches of water (100 decaPascals) across filters can increase your fan energy draw by 20-55%, potentially eliminating any savings from installing a VFD and increasing the energy usage of your dust collector.

An airflow controller with VFD maintains the design airflow in your dust collection system and works to maximize filter performance and help create energy savings.

Monitoring Energy Usage with a Connected Dust Collector

When taking steps to reduce energy consumption in your dust collection system, it's important to also monitor the impact of those changes. If you can't measure it, you can't improve it. For successful sustainability reporting, it's critical that you collect data to show the investments that you are making have positive results.

Building on more than a century of filtration experience and the latest IoT technology, Donaldson's iCue™ connected filtration service is designed to remotely monitor a facility's dust collection system and provide operational insights directly to end-users.

Donaldson's iCue service includes VFD monitoring and tracks the instantaneous power and daily energy consumed by the fan. This data is critical to understanding sustainability KPIs and provides users with a baseline, so energy usage can be optimized for efficiency and savings can be quantified.

The collected data and insights are important because maintenance managers often want to run filters as long as possible to keep part and labor costs low. Yet, knowing the best time to optimize interval filter changeouts can help maintain consistent facility uptime and support larger company initiatives focused on sustainable and energy-saving practices.

Facility management teams who exhaust filtered air inside their building should also consider using connected monitoring and automatic alerts, so they know when a potential issue is detected and can quickly act. Furthermore, exhausting inside the building increases the need for real-time alerts since any problems with the dust collector can immediately affect production lines, machines and workers.

Below are three key indicators tracked by the Donaldson iCue service to gauge energy usage in a dust collector:

- **A differential pressure alert** helps you know when filters need to be changed or if they are plugged. For example, remote monitoring can track the pressure of a HEPA filter, to help you manage the air returning to your plant.
- **A particulate trend alert** may signify a filter rip, allowing you to quickly change it out and minimize dust build-up in your plant.
- **Airflow data** helps you know when you have significant capture velocity and conveying velocity in your plant's vents.

The Donaldson iCue digitally monitors dust collection equipment performance.

Supporting Your Company's Energy Saving Program

Monitoring and measuring dust collector energy usage can have a significant, positive impact on your energy saving program. Once your sustainability strategy is in place and you've evaluated your approach to emissions exhausting, consider taking advantage of a monitoring service like Donaldson's iCue service. It can help extend your dust collector's filter life, conserve energy in your facility, improve your annual budget, and ultimately, assist your company in meeting important sustainability goals.

To learn more about Donaldson's iCue service or request a demo, visit **Donaldson.com/ConnectedSolutions,** email **connectedsolutions@donaldson.com,** or call **+1 833-898-5996.**

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