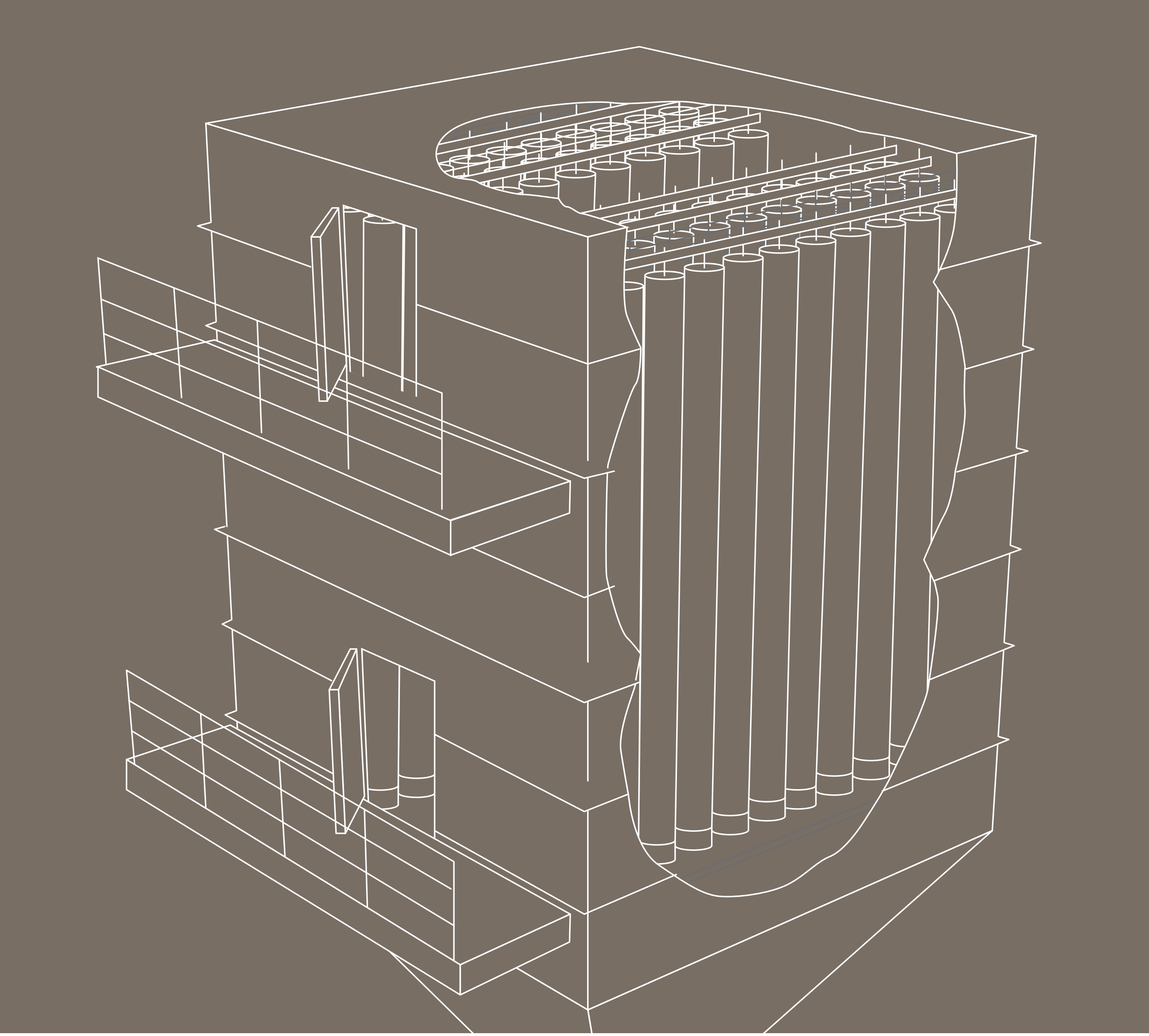

Five Ways To Improve Your Pulse-jet Baghouse Performance

Cost-effective modifications can provide an immediate impact on performance

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An inefficient pulse-jet baghouse dust collector can lead to unnecessary downtime, excess energy consumption, and ineffective dust filtration. However, you can implement cost-effective modifications and upgrades that will provide an immediate impact on overall baghouse performance without having to completely rebuild your dust collector.

1 Correctly install the bag filters.

Ensure that your baghouse dust collector's bag filters are correctly installed; this will maximize the filter media's operating life and minimize downtime and maintenance costs. Check that bag filters with flanges or cuffs that fold over the tops of their support cages are smooth around the edge to prevent leakage and bag abrasion. Install bottom loading bags so that their seams are 180 degrees from the split or gap in the cage collar; facing all bags the same direction will aid troubleshooting procedures. Install the bag clamps 90 degrees from the bag seam and position them on the groove in the cage to ensure a tight seal. Install top-loading snapband bags with their seams all facing the same direction to allow you to quickly and easily identify areas where prob- lems may occur.

The clean-on-demand system takes the guesswork out of knowing when to manually activate and deactivate the baghouse pulse cleaning cycle.

2 Use a clean-on-demand system.

A typical automatic clean-on-demand system for a pulse-jet baghouse dust collector consists of a differential pressure gauge and a programmable controller. The differential pressure gauge measures the difference in pressure between the dirty-air side and clean-air side of the bag filters in the baghouse. The pressure gauge sends the differential pressure readings to the controller, which is programmed with a high and low pressure set point. When the differential pressure reaches the high pressure setpoint, the controller activates the baghouse's pulse cleaning cycle, which restructures the dustcake on the filters while moving a portion of the dust into the hopper of the baghouse, lowering the pressure. When the differential pressure reaches the low pressure set point, the controller shuts down the pulse-cleaning cycle. Installing a clean-on-demand system in your baghouse is fairly easy and inexpensive to do, especially when compared to the benefits you'll receive from using one. The clean-on-demand system takes the guesswork out of knowing when to manually activate and deactivate the baghouse pulse cleaning cycle and helps prevent the bag filters from being over or under cleaned. Properly cleaning the bag filters optimizes their dust collection efficiency and maximizes their operating life, which reduces the baghouse's energy and compressed air requirements and helps minimize your operating and maintenance costs.

3 Integrate other controllers with a clean-on-demand system.

When a bag filter is pulsed, the air pulse removes the collected dust from the bag and rearranges the remaining dustcake structure on the bag's surface. If the bag filter rows in a baghouse with high upward gas velocities are pulsed sequentially, one row after the other, submicron dust from the bags being cleaned can migrate back onto the clean bags in the previous row. When this occurs, a dense dust cake can form on the bags, which leads to higher differential pressures and inefficient baghouse operation. You can avoid this by using a sequential controller to stagger the pulse cleaning system's bag row activation order.

A sequential controller controls the order in which the bag filter rows are cleaned when the pulse-cleaning cycle is activated. Staggering the order of rows to be cleaned lessens dust re-entrainment on the bags and improves dustcake formation for optimum filtration effectiveness. For example, you can program the sequential controller to pulse-clean rows 1, 4, 7, 10, 2, 5, 8, 3, 6, 9, and so on until all of the bags have been cleaned.

When using a sequential controller, program the pulse frequency rate so that each subsequent row is pulsed only when the compressed air pressure in the system's header is fully regained. This will produce a consistent pulse force for each bag filter row and ensure that the bags are properly cleaned. To further ensure proper bag cleaning, make sure that the pulse generated during the pulse-cleaning cycle is short and crisp, generally about a 0.1-second interval.

If your baghouse doesn't have a differential pressure clean-on-demand system, you can use a controller that can be programmed to activate the pulse-cleaning system based on time. A potentiometer on the control panel allows you to activate the pulse cleaning cycle from every 3 to 30 seconds or more, depending on your process operating parameters. Since it's vital to maintain a proper dustcake layer on the bag filters, the cleaning frequency should be set to ensure that the bags are not over- or under-cleaned.

To centralize control of your baghouse dust collector, you can install an LED controller that provides a 4- to 20-milliamp signal to an external PLC controller or computer for remote monitoring and control. This will also allow you to collect and store differential pressure readings, pulse cleaning cycle activation and deactivation times, and other operating parameters. Such operational records will help you more quickly pinpoint problem areas and correct them.

This cutaway image shows the correct installation of an automatic clean-on-demand system's differential pressure gauge.

4 Install 1.5-inch double diaphragm pulse valves in the pulse-jet cleaning system.

In a pulse-jet baghouse dust collector, the diaphragm pulse valves that generate the pulse air for cleaning the bag filters must be able to create a crisp and instantaneous air pulse that travels the entire length of each bag like a shock wave to effectively clean it. A 1.5-inch double diaphragm pulse valve easily accomplishes this and is much more effective than a smaller size double diaphragm valve or any single diaphragm valve.

When a double diaphragm valve operates, it releases through a small vent port in the pilot solenoid valve a comparatively small volume of air that's holding a small secondary diaphragm closed. At the same time, the air pressure holding the main diaphragm closed is released through a large vent port in the pulse valve, which allows an immediate discharge of pulse air into the blowpipe to generate a strong air pulse in the bags. In contrast, a single diaphragm valve releases all of the air that holds the diaphragm closed, and that air then travels the length of the pilot tubing and escapes through a small vent port in the pilot solenoid valve. This slows the release of pulse air into the blowpipe and lim- its the air pulse in the bags.

In addition to releasing the pulse air more quickly and forcefully, a 1.5 inch double diaphragm valve and blowpipe have a 1.76 square inch cross-sectional area, which provides sufficient area for the pulse air to flow unimpeded to all blowpipe orifices. In contrast, a 1 inch double diaphragm pulse valve and blowpipe have a 0.88 square inch cross-sectional area, which imposes a restricted area that impedes the airflow to the blowpipe orifices.

Changing to a 1.5-inch double diaphragm valve is fairly easy to accomplish and should save you a significant amount of money in bag change outs and production loss caused by insufficient bag cleaning.

5

Many plants spend time manually inspecting each bag filter for tears, holes, and leaking seams, which can take many hours and often doesn't find all leaks. In addition, structural air leaks in the baghouse, such as from weld cracks or misfitted metal enclosure covers, can't be detected unless they're clearly visible. A more accurate way to test for such leaks is by using a leak detection powder, also called a *tracer powder*.

A leak detection powder is an inexpensive, lightweight fluorescent powder that you inject into the baghouse.

A leak detection powder is an inexpensive, lightweight fluorescent pow- der that you inject into the baghouse. The powder will take the path of least resistance and move with the air through any leaks, accumulating around the openings. To make the powder fluoresce (glow brightly), which pinpoints a leak's location and severity, shine a monochromatic light into the baghouse. After repairing the leaks, conduct a second test with a different color powder to ensure that you've found and eliminated all leaks.

To ensure that you find all the leaks regardless of their size, use a leak detection powder with varying particle sizes to minimize fabric bleedthrough. Additionally, select the powder color best suited for your application since some colors work better than others depending on the application and dust being collected.

Use a leak detection powder.

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Parker Hannifin Corporation
Industrial Gas Filtration and Generation Division
11501 Outlook Street, Suite 100
Overland Park, KS 66211 USA
p: 800.821.2222 | f: 816.353.1873
e: filtration@parker.com
www.BHA.com

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