Tips

Five ways to improve your baghouse performance

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The baghouse dust collector is an integral component of many dry bulk solids processes. However, many baghouses don't operate at optimal efficiency for today's aggressive production demands. Some weren't properly designed or were undersized to save money, resulting in performance problems throughout their lifetimes. Follow these five tips to improve your baghouse performance.

1 Use an inlet design that's right for your application.

Air filled with process dust enters the baghouse through the dirty-air inlet, which is often located in the hopper below the baghouse's filter section. (The hopper also collects the dust that falls off or is cleaned off the bag filters.). Some hoppers incorporate a baffle over the inlet that directs the incoming dust-laden air downward into the hopper. This downward airflow can cause dust particles to swirl upward and become re-entrained on the bag filters. When combined with the incoming process dust, the re-entrained dust produces a higher *grain loading* (the number of dust particles per cubic foot per minute of airflow) on the bag filters than the filters can handle efficiently. Some inlet designs direct the incoming dust-laden air straight across the hopper; in a narrow hopper, this can cause excessive abrasive wear on the baghouse wall opposite the inlet.

There are two ways to prevent these problems. You can enlarge the dirty-air inlet to reduce the inlet airflow velocity. Or you can install a *ladder vane baffle* inside the hopper. This baffle has several openings that create a more uniform airflow velocity profile in the hopper, reducing turbulence and uneven grain loading. By allowing better distribution of the inlet air, the baffle minimizes dust re-entrainment and reduces the amount of material carried to the filter surfaces. These baffles are typically inexpensive and easy to install.

2 Improve the air-to-cloth ratio.

One of the most important but often-overlooked baghouse design elements is the proper air-to-cloth ratio — that is, the air volume being handled per unit of filter cloth area. An improper air-to-cloth ratio can contribute to baghouse inefficiency. For example, a baghouse operating at too high an air-to-cloth ratio may have problems with high pressure drops, insufficient filter cleaning, and inadequate suction at the dust collection system's pickup points.

Pulse-jet baghouses that use felted filters and clean while online can operate at higher air-to-cloth ratios than shaker and reverse-air baghouses that use woven filters and clean offline. Here are some typical efficient air-to-cloth ratios:

- Most pulse-jet baghouses operating in ambient temperatures: no more than 6-to-1.
- Pulse-jet baghouses operating in higher temperatures: between 3- and 4-to-1.
- Shaker and reverse-air baghouses: not above 2.5-to-1.

Having the correct air-to-cloth ratio from the baghouse's initial installation will definitely save money over the life of the unit. But if your baghouse *doesn't* have a proper air-to-cloth ratio, you can take measures to improve it. For example, switching to a different filter media may solve the problem. Installing pleated filters to increase the cloth area in the baghouse is a proven method of lowering the air-to-cloth ratio. (Be aware that using pleated filters does change the air-to-cloth ratio guidelines.) Consult with your baghouse filter supplier to find the right solution for your application.

Dust that's cleaned off the filters should be removed from the hopper as soon as possible to prevent re-entrainment.

3 Don't use the hopper for material storage.

Many problems can occur when a baghouse hopper is used to store material. The hopper's primary functions are to allow the dust-laden air into the baghouse and to promote the discharge of collected dust into a bin or screw conveyor for further processing, recycling, or discarding. When collected dust is stored in the hopper, it can build up and allow dust re-entrainment on the filters, abrading the filters' lower portions and shortening the filter life. Dust that's cleaned off the filters should be removed from the hopper as soon as possible to prevent

re-entrainment. You can use an airlock or dump valve to continuously remove the dust.

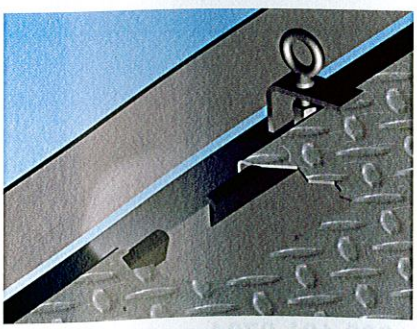
Even if the hopper isn't used for storage, you might find dust building up on the sidewalls or bridging over the hopper outlet. These problems can cause the dust to be re-entrained on the filters or cause slugs of material to be emptied all at once instead of in a steady, even flow.

Maintaining proper door seals is inexpensive and easy to do.

4 Make sure that baghouse access doors seal properly.

Access doors allow maintenance personnel to enter the baghouse to detect leaks, change bag filters, and troubleshoot problems. It's essential that these doors create a positive seal to reduce baghouse dust leakage, air leakage in or out of the baghouse, and heat loss. Proper door seals also reduce condensation that can cause filter failure and severe corrosion.

Maintaining proper door seals is inexpensive and easy to do. Be sure to inspect all doors regularly and whenever the baghouse is down for repairs or filter changeouts. At each inspection, ensure that there's a positive contact between each door seal and the door pan. Various door seals are available for different door configurations and to suit your application's gas chemistry and temperature.



This cutaway image shows the components of a door and U-channel door seal.

5 Conduct proper maintenance and recordkeeping.

Proper maintenance and recordkeeping play a vital role in efficient baghouse operation. The information gathered during maintenance inspections can help you implement an effective preventive maintenance program. Documenting inspections, observations, and maintenance helps you monitor the unit's operating efficiency and helps prevent your plant from reaching noncompliance status with OSHA and other standards.

Monitor and carefully document changes in baghouse operation (including pressure drop and grain loading) and production processes. All of these can have a substantial impact on baghouse performance. Also monitor and document the baghouse filter-cleaning cycle adjustments and stack emission levels.

Keep records both of regularly recorded information and information that's recorded on specific occasions, such as at system startup, system shutdown, filter inspection, and troubleshooting. During the initial system startup, document operating information hourly to establish the initial operating criteria. After the baghouse has been operating for some time and you're more familiar with its operation, you can do these reports once or twice per shift. Regularly chart the baghouse's pressure drop and inlet temperature, and maintain these charts to compare the information to current baghouse data.

Useful documents to keep in your records include baghouse fact sheets, failed-filter charts, maintenance reports, and emergency worksheets. All of this information is easily obtained and inexpensive to maintain at your plant. **PBE**

For further reading

Find more information on this topic in articles listed under "Dust collection and dust control" in *Powder and Bulk Engineering*'s comprehensive article index (in the December 2009 issue and at *PBE*'s Web site, www.powderbulk.com) and in books available on the Web site at the *PBE* Bookstore. You can also purchase copies of past *PBE* articles at www.powderbulk.com.

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