SUPPLIERS' TIPS

There's not enough airflow at our dust collection system's capture hoods. What could be behind this?

Editor's Note: In last year's October issue, we received many submissions for our monthly supplier question. Here are a few more of the responses that we couldn't include in that issue.

Insufficient airflow at the capture hoods is caused by an unbalanced ventilation system. A ventilation system has multiple parts that all need to be in balance for the system to operate as designed, including capture hoods, ductwork, dust collector, and fan. Here are troubleshooting ideas for each system part:

Capture hoods. Capture hoods must be sized appropriately. An undersized capture hood will provide inadequate airflow. On the other hand, an oversized capture hood will provide inadequate capture velocity.

Ductwork. The transport velocity in the system's ductwork can vary depending on the type of material the system is collecting. Fumes require airflows at 2,500 fpm; very light powders require 3,000 to 3,500 fpm; medium powders require 3,500 to 4,000 fpm; and heavy powders and dust require 4,000 to 4,500 fpm or more.

Ductwork with too many elbows or transitions can experience excessive static pressure losses.

Unbalanced airflow in your system's ductwork can mean that you have too much airflow at one capture point and not enough at another. Installing a manual blast gate at every capture point is an inexpensive and easy way to ensure a balanced airflow.

Dust collector. If your dust collector has a high pressure drop, then your cleaning system may not be functioning properly, or the filters may need to be replaced.

Fan. Different parts of the system that cause an increase in the system's static pressure or system flow will ultimately affect the fan. If an electrical connection within the system is wrong, then you'll probably notice the problem during system startup.

It's always good to "bump" the fan motor to check and verify rotation. Even if a fan is rotating in reverse it will create some suction, but it won't be adequate for proper airflow.

Another issue that can affect the system's airflow volume is the fan damper. All fans should have a means to control the airflow, and typically a manual outlet damper is used. A damper is the gross airflow adjustment, and blast gates are the fine airflow adjustment.

Fan curve can also affect system performance. Every fan has a fan performance curve that's a graphical representation of static pressure versus volumetric flow. When initially designing a system, it's important to select a fan designed for the calculated static pressure and airflow. Also, it's highly recommended that you include some buffer to accommodate differences between design and actual airflow. As the old adage goes, "You can't always damper down, but you can damper up."

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When trying to solve a performance problem in your industrial ventilation system, like poor airflow at hoods, examine the entire system, not just the large system components. Problems with the dust collector or fan can be easy to identify, so you start with them because sometimes replacing filters or adjusting a fan damper may solve the issue. But if there are no obvious issues with these major components that would cause poor airflow at the capture hood, you must conduct a systematic assessment of the entire system to find the issue's root cause.

An early question should be: Have all or only some hoods stopped getting adequate airflow? If only some of the hoods are impacted by inadequate airflow, airflow distribution, not total airflow, is likely the problem. This discovery allows you to begin troubleshooting by determining which hoods aren't getting adequate airflow.

If none of the hoods have adequate airflow, don't jump to conclusions. Did the hoods ever have adequate airflow? Answering this may require you to review initial design calculations and system exposure testing records. If the system should be capable of adequate airflow and initially delivered adequate airflow, then start looking for changes that have been made to the system.

If the hoods used to have adequate airflow, when did the performance change? Begin by thinking about what system conditions changed around the same time or just before the hoods stopped performing adequately. Maybe the system underwent modifications, such as the removal or addition of workstations. Either change can result in dramatic shifts in airflow distribution. Look for significant service on the system, and remember that sometimes service can inadvertently create another service issue. Did someone accidentally crush a duct section, or shift the duct route at some point to get around a new obstacle? And don't forget to consider the duct's physical condition — has it changed? Holes in the duct allow air to enter at points other than the hoods, and a dirty or blocked duct can reduce airflow.

Asking questions about the entire system may highlight common issues that get to the root cause of poor hood airflow more quickly than jumping to conclusions about the major components only. The book *Industrial Ventilation: A Manual of Recommended Practice for Operation and Maintenance*, 2007 edition, Chapter 7, "Troubleshooting Ventilation Systems," is an excellent resource when troubleshooting airflow problems.

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Equipment suppliers are a valuable source of information about equipment and processes. In light of this, each month we ask suppliers a question of concern to our readers. Answers reflect the suppliers' general expertise and don't promote the suppliers' equipment. If you have a question you'd like suppliers to answer, send it to Kayla Carrigan, Associate Editor, Powder and Bulk Engineering, *1155 Northland Drive, St. Paul, MN 55120; fax 651-287-5650 (kcarrigan@cscpub.com).*