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Getting it right the next time

Sometimes, dust collection systems don’t work well. I’ve encountered situations where systems don’t reduce the airborne dust that personnel are exposed to and systems that are constant maintenance problems. Even if a dust collection system is properly designed and engineered, problems can still occur because of management decisions, maintenance issues, or technical problems. This column will cover how to correct certain dust collection system issues by describing several cases that show what happened to cause problems, and the corrective actions taken to solve those problems. This can help you reduce production downtime, cut operating costs, and, hopefully, do it right the next time.

Canopy hood for dust control fails again. A benchtop hand-milling operation was exposing the technician to excessive dust. In-house design produced a canopy hood with a 4-inch duct connection to the existing dust collection system, installed above the technician’s head. I was called in to find out why the canopy hood was not doing its job. The in-house designer wanted to increase the exhaust airflow to the canopy hood for better dust capture. I explained that all increased exhaust airflow was likely to do would be to pull more dust up past the technician’s breathing zone, increasing the technician’s exposure to the dust. I asked maintenance personnel to remove the 4-inch flexible duct from the canopy hood and place it close to the milling feed and discharge points. Once the duct was repositioned, you could see fugitive dust get pulled right into the exhaust duct. After that, a simple local exhaust ventilation hood connecting to the 4-inch exhaust duct was fabricated for permanent installation at the mill.

Improper filter cleaning makes things worse. While designing a central dust collection system in another plant, I noticed a technician servicing a self-contained bag-dump station. The access door protecting the cartridge filters was removed and the filters were being cleaned in place manually with a compressed air hose. The technician explained that the filters plugged frequently and that this was the best way to clean them, although it didn’t seem to help much. In fact, although some dust was being removed from the filter, the compressed air was also driving dust into the filter media, which increased plugging of the filter media. I noticed that the pressure to the automatic filter cleaning system built into the bag-dump station was at 40 psig. The solution was to ask maintenance personnel to adjust the pressure to 20 psig to prevent dust from being drawn into the filter media.

Shortcuts that cost. A manufacturing plant handling toxic powders had just installed a new dust collection system. The immediate problem at startup was that the new system did not generate enough exhaust air to meet the air quantities that the design specified for each dust capture point. The survey I conducted started by comparing the original design to the installed system. Design airflows for dust capture were reasonable for each dust capture point, ductwork design was good, static pressure calculations were fine, the fan selected met requirements, and the dust collector showed low pressure drop across the filters as expected. However, when the system started up, the fan did not deliver the full airflow as designed, and it pulsed. The problem was that the main exhaust duct entered
to increase the pressure to 90 psig. That change, combined with new filter cartridges, solved the plugging problem. Manual filter cleaning was no longer necessary and filters lasted longer.

**Poor communication dooms project.** Stateside Corporate Engineering and its offshore plant management were finally reviewing completed design documents for a new 30,000-cfm central dust collection system. The plant had never had a major dust collection system to serve production operations. At the start of the engineering and design stage of this project, plant management assigned a representative to be the plant liaison between corporate engineering and the production and maintenance departments to facilitate project understanding and acceptance. Periodic meetings between the liaison and corporate engineering during the engineering and design stages went well, covering dust control hood designs, ductwork layout, and the location of the central dust collector and fan. Compromises were made and agreements were reached — or so everyone thought. Corporate engineering never met with any production or maintenance personnel during engineering and design.

At the final review of the 9-month project, the liaison reported that maintenance did not want a single 30,000-cfm dust collector because there would be too many filters to change! Corporate engineering then suggested putting small individual dust collectors in each production area suite. The liaison agreed. Ductwork was redesigned and a small dust collector was installed in one production suite as a pilot project. The pilot dust collection system did its job well but the overall project was never completed. Production said that maintenance had to clean the dust collection system for the next

the fan inlet with a 90-degree elbow. Unless a duct enters a fan with a sufficient length of straight duct to eliminate air turbulence at the fan inlet, fan performance will be negatively affected.

The sheet metal contractor didn’t follow the engineer’s design drawings as required in the bid documents and, instead, saved money by installing an elbow at the fan inlet. The project engineer never visited the job site during construction and, therefore, didn’t catch this change. Fortunately, the problem was easily corrected by installing a fan inlet box. The retainer held back from the contractor’s final invoice covered the cost of installing the fan inlet box.  

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