Getting Smart About Dust

Bell, California — Seeing 250,000 pounds of product go to waste each year can bring a tear to any company’s eye. For powdered food processor Allied Blending & Ingredients, Inc., (Keokuk, IA) there was little comfort in knowing that product shrinkage on this order — one percent — is actually the industry norm when handling 25 million pounds of ingredients each year. However, a well designed dust collection system from United Air Specialists drove that number down to just 0.25% at the company's new Bell, California, plant, turning a "below average" performance into above average savings.

As a supplier of baking mixes, dairy blends, premixes for cheese and tortillas and other powdered ingredients for the food industry, and a provider of toll blending services (contract mixing another company’s ingredients), Allied Blending knows the challenges of handling powders, which easily become fugitive airborne dusts. The company had long struggled with two dust collectors at its original California plant, which handled only 10 million pounds per year. "We had substantial dust on our equipment, floors and in the air, and our shrink levels were around 1.25 percent," said Matt Stelzer, Allied Blending’s VP of Operations at the California facility.

Shrinkage and fugitive dust are problems many in the industry face, because of variables inherent in designing an efficient dust collection system. These include determining proper hood design, placement and fan size; selecting reliable and efficient filtration methods; and calculating precise air flow rates and velocities. Flow rates at the hoods, for example, need to be high enough to entrain fugitive dust, but not so high as to pull excess ingredient powder into the system, leading to waste.

Meeting performance, safety and FDA requirements

Stelzer aimed for a much lower shrinkage rate while planning for the company's new 25-million-pound per year plant, and he knew that a sister facility had been pleased with the long-term performance of a dust collection system from United Air Specialists (UAS). After evaluating three dust-collection system suppliers for the new California plant, Stelzer and plant manager Juan Mora selected a central-system design using the UAS model SFC 32-4 downflow cartridge collector rated at 15,000 CFM (cubic feet per minute) capacity. This unit draws contaminated air in through its top and forces it downward through horizontal cartridge filters. The high-efficiency filter media traps contaminants, and the air passes through an after-filter before being released back into the plant or outdoors. A reverse pulse of compressed air through the filter cartridges periodically dislodges captured dust, which falls into a receptacle for disposal.

With the core unit selected, the central system was then designed so it could handle dust generated in each of the new plant's three separate 1200-square-foot production rooms, while complying with FDA requirements.

The Dairy 3A blending and batch pack rooms, for example, required custom stainless steel duct and Clean In Place (CIP) design to prevent ingredient cross-contamination, an FDA requirement when equipment processes allergens such as powdered milk, then switches over to run a different product. As Stelzer explains, “We use one of the rooms to process whey, nonfat dry milk and yeast, and another for mixing tortilla premixes (batch packs) with salt, sugar and micro-ingredients. So to comply with FDA regulations, 304 and 316 stainless steel duct is used as necessary, and the system is designed to minimize or eliminate areas that can harbor particles.” CIP design allows certain sections of the ducting to be removed and cleaned in a separate washroom, while the remaining ducts and hoods are sanitized in place.

To improve air handling efficiency, conserve floor space and address potential explosion venting requirements, the collector is sited on a mezzanine above the control room, in the center of the plant. From this location the SFC functions as a central system, ducted to three precisely defined collection points in each processing room. This ensures optimum airflow is pulled from each room's hoods and carried to the collector. Then clean, filtered air is recirculated back into the air-conditioned warehouse to save energy. With its proximity to the ceiling, the mezzanine location also provides contingency for explosion venting through "an outside wall." Other worker well-being and performance considerations include a silencer that reduces the noise level of the system's self-cleaning process, and a safety after-filter.

By using bag-in/bag-out collars and two sets of cleanable cartridge filters, maintenance is quick, easy and tidy. According to Juan Mora, "We change the filters out monthly, and clean a set while the others are in use. It takes less than 30 minutes to change them." With three shifts running five days each week, this method minimizes downtime and promotes fast job changeovers, as required by the company's Lean Manufacturing philosophy. The filters themselves are long lived, so replaced only infrequently.

Clearing the air — and reducing waste

Product shrinkage is unavoidable when handling powdered food ingredients, but given the volumes of material involved, even a modest reduction in shrink can make a significant impact on a company's cost of goods. The reduction from Allied's old plant to the new one — 1.25 percent to 0.25 percent — is more than modest, and well below the industry average of 1.0%. Additionally, the facility is virtually dust-free, workers breathe cleaner air, and the company benefits from reduced changeover and dust collection system maintenance costs. The improvement over the old plant is obvious, as Matt Stelzer explains. "When people familiar with the appearance of a powdered food-processing facility visit our plant, they are surprised to learn that we do blending here because it is so clean."

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