SUPPLIERS' TIPS

How can I control my dryer to improve the final product's moisture uniformity?

In general, dryer control is improved by working on two important factors. The first is a well-designed feedback control scheme. There are many good approaches to feedback control, depending on dryer and material characteristics. A cascade control usually provides tighter control of product moisture than a single-loop control. These controls should have provisions to respond properly when the eventual upset condition occurs.

The second is the concept that long, steady production runs are always better than shorter runs, volatile material feed conditions, feed gaps, and the like. Anything that can be done to improve these areas will improve uniformity. The controls can be set closer to your application's ideal setpoint, thereby saving energy and producing more uniform moisture in the final product.

Bill Horton, application manager, Carman Industries, 812-288-4703

To improve a final product's moisture uniformity in a continuous vibrating fluid-bed dryer:

- Start with a uniform initial product moisture.
- Make sure the product feedrate into the fluid-bed dryer is metered at a controlled rate and doesn't exceed your dryer's design capacity.
- Adjust the weir to create a uniform bed depth. Try various bed depths in the range of 1 to 6 inches to find the best depth for your application.
- Adjust the inlet blower's airflow to achieve adequate and uniform air distribution across the entire material bed.

Henry Alamzad, president, Kason, 973-467-8140

Product uniformity must be addressed in two separate parts: instantaneous and time-based moisture uniformity. Instantaneous uniformity is where each particle exiting a dryer has the same or similar final moisture content. Controlling the particle size and moisture content when the particles enter the dryer is important for achieving uniform moisture. In the dryer, airflow must be controlled so that each particle is exposed to the same drying conditions, including airflow rate and direction, temperature, and retention time in convection units.

Time-based moisture uniformity is achieved using a control system that can adjust drying conditions based on changes in the material throughput, inlet moisture content, and ambient conditions. The control algorithm typically uses temperature measurements that relate the heat transfer to the drying rate. Sensors that measure the finished product's moisture content can also be used to provide feedback on changes in the drying conditions to achieve a uniform moisture content over time.

Michael Whaley, senior process engineer, Buhler Aeroglide, 919-851-2000

How can I improve my drying process energy efficiency?

There are several methods you can try to improve your drying process's energy efficiency. If your dryer's outlet temperature is high enough and the exhaust airstream is particulate-free, try installing an air-to-air heat exchanger to extract energy from the exhaust stream. This can potentially yield an energy savings of 20 to 25 percent. Also, make sure you insulate as much of your equipment as possible and check your old insulation for damage. Try operating your dryer at a lower outlet temperature if your final product can tolerate slightly higher final moisture content. You can also optimize your feedstock to maximize solids concentration and investigate new nozzle technologies to help process higher solids.

Paul McFarland, product development manager, American Custom Drying, 609-387-3933

There are several ways to improve your drying process's energy efficiency. First, try reducing your required drying amount by keeping the dryer feed moisture as low as possible. You can do this by using centrifuges, presses, static drainage, or other components. If you keep the amount of water to be evaporated to a minimium, your energy use will stay low.

Try reducing your energy use by increasing the inlet hot-gas temperature for convection drying or increasing the surface temperature for conduction drying. Insulating a dryer will reduce radiant heat losses. Recovering heat from exhaust gases may reduce your energy use, but keep in mind that it could result in major capital expenditures for very little savings. Another way to improve efficiency is to increase the intimate contact between the heat source and the wet material. Better mixing and reduced surface area fouling will assist conduction heat transfer. And maximizing contact time between the hot drying gases and the product being dried assists fluid-bed and rotary convection dryers.

Jeff Morris, vice president, Heyl & Patterson, 712-788-9810

Equipment suppliers are a valuable source of information about equipment and processes. In light of this, we occasionally 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 Alicia Tyznik, Associate Editor, Powder and Bulk Engineering, *1155 Northland Drive, St. Paul, MN 55120; fax 651-287-5650 (atyznik@cscpub.com).*