SUPPLIERS' TIPS

We need to reduce the moisture content of a water slurry to 10 percent moisture or less. What advice can you give?

The first step in reducing a slurry material's moisture content is to reduce the evaporative load. Mechanical dewatering is always more efficient than thermal drying, and increasing the solids concentration will allow you to minimize the dryer size. Some basic advice would be to:

- Minimize the amount of water in your process.
- Use an evaporator, centrifuge, spin dryer, belt filter, or rotary screener to dewater the material. The best dryer is *no* dryer, so dewater to the desired moisture content if you can.
- Preheat the material feed, which may reduce the slurry's viscosity and moisture content.

The second step is to decide whether you want a direct dryer, in which heated air directly contacts the material, or an indirect dryer, in which heat is transferred to the material through a metal wall or surface. If the resulting material is explosive, would cause an air pollution control issue, or if you want to minimize airflow, then you should strongly consider an indirect dryer. If the material is pumpable and has certain particle size requirements or is difficult to mechanically dewater, you should look at a spray dryer, fluid-bed agglomerator, or rotary drum (indirect steam-heat dryer). You may want to consider using a two-stage dryer (spray and fluid-bed), since spray dryers are expensive and energy intensive. A two-stage dryer can be less expensive with a lower heat history and achieve a lower material moisture content. If you can dewater the material down to a filter cake, narrow down the choices to two or three dryer suppliers and choose from direct dryers, such as fluid-bed, belt, rotary, or flash, or choose from indirect dryers, such as disc, screw, or low- or high-speed paddle.

The third step is testing to confirm the dryer design. This means that you may need to get an estimate prior to testing to eliminate budget-breaking designs and find out the explosive properties of the material, if applicable. Visit test facilities ahead of time to understand the dryer's design limitations. Take video and pictures during testing and be sure to think about whether the test unit can be easily scaled up for your application.

The fourth step is choosing the right dryer. Look at overall costs, such as spare parts, maintenance, installation, insulation, building costs, and energy consumption. Decide whether your material needs a cooling step and whether a sanitary design or cleanability is necessary for your process. Make sure to choose a dryer with a wide window of operation to handle materials having higher-than-normal moisture content, and visit similar installations to help make your final decision.

Jim Schak, product manager, Kason, 973-467-8140

You could first evaporate a majority of the water in the feed slurry using a predrying heat-transfer screw. When the moisture content is about 20 percent, you could feed the material into a rotary mill-flash dryer to remove the remaining moisture and deagglomerate the leftover solids, reducing the material down to 10 percent moisture.

Though you could do all of the drying using air, this would require significantly more air because of the slurry's high initial moisture. You'd also need a larger air heater to reduce the moisture, a larger dust collector, and a larger fan to pull the increased air through a flash dryer, resulting in higher energy consumption and more initial capital cost.

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The first thing to consider would be ways to increase the solids content of your slurry. You could use a mechanical press to save process costs (energy and utilities). A thin-film belt dryer, freeze dryer, or spray dryer might offer a one-step solution, but these tend to cost more and use more utilities.

Once you've achieved an increased solids content resulting in crumbly, free-flowing material, you can assess other dryers for reducing the moisture content to 10 percent or less. This will depend on whether your material releases moisture slowly or quickly.

If slow drying is needed, this will limit your dryer choices to a rotary drum dryer, a fluid-bed dryer, or some type of dryer that offers your material residence time. You may need 1 minute, 10 minutes, 1 hour, or even a few hours. These dryer types are generally large and require a larger footprint to give the material time and space to dry.

If quick drying is needed, then a good choice is a flash dryer that protects material by evaporative cooling and usually releases material moisture immediately upon contact with its heated airstream. Residence times within this dryer type are typically measured in seconds, and the dryer's footprint is typically smaller than the previous dryers mentioned.

You should also consider temperature sensitivity. Will your material burn at a certain temperature? Will the basic characteristics of your material change with heat? Addressing these questions will help you decide which dryer is right for your application.

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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).*