Tips:

How to dedust your friable material in a continuous blender

If you're looking out your process control room window right now and can't see the workers or equipment behind the dust cloud, read this article. It explains how to control dust by dedusting friable materials in a continuous blender.

Maintaining clean air for workers, minimizing housekeeping labor, and keeping your customers happy can be challenging when you process a friable, dusty material such as granular detergents, synthetic or natural resins, cereals, granular clay, ceramics, granular salts, fly ash, or powdered coal. For instance, granular clay, whose absorptive properties make it ideal for use as an herbicide or pesticide carrier or for cat litter, is often *polished* — agitated in a blender to remove the granules' rough edges — to help it flow better. Such polishing generates a lot of dust. One way to control the dust is to process the granular clay in continuous mode: polishing and then dedusting the granules in the same continuous blender.

Dedusting, which means dispersing a liquid dedusting agent through a spray line and nozzle onto a dusty material to slightly wet the dust and agglomerate it, can be done in many types of continuous blenders. To choose the right machine for your application, you need to understand your material and process variables. The variables include your material's flow properties, friability, resiliency (how well it withstands impacts without degrading), compaction tendencies, abrasiveness, and heat tolerance; the dedusting agent your material requires, which depends on the material's absorptive properties; your processing rate; and the space available in your process line for the equipment.

Selecting a blender

Once you understand these variables, select the continuous blender that will achieve your process goals most cost-effectively. Work closely with the blender supplier to arrive at that choice. Typically, this involves thoroughly discussing your process variables and participating in tests of your material at the supplier's test center.

Various continuous blenders can handle dedusting, depending on the application. If your material doesn't flow easily and needs a mechanical push through the dedusting process, consider using a pug mill, screw conveyor, or high-intensity paddle blender. For instance, with a poorly flowing material that tends to compact, such as powdered coal, a high-shear, low-speed pug mill can generally do the job because it pushes the material along and prevents caking. If your material has average flow properties and abrasiveness, such as granular salt, a cut-flight screw conveyor can work; the flights' deep notches promote mixing along the conveyor's length.

For a poorly absorptive material such as fly ash in a high-throughput application, the space-saving high-intensity paddle blender is a good choice because it provides very intense, fast mixing in a small vessel, maximizing the particle surface area exposed to the dedusting agent. However, avoid using this blender for a material that's too abrasive or heat-sensitive to withstand the unit's high shear and the heat generated by the mechanical mixing action.

If your material flows well but is susceptible to fracture or attrition, such as granular clay or cereal, use a rotating-drum continuous blender. The unit gently tumbles and folds the material while creating a large, constantly flowing material bed that's ideal for spray addition of a dedusting agent. The low-power, energy-efficient action doesn't subject the material to the shear, compression, impact, and heat inherent in other blenders, where a long residence time can damage a material. Thus the residence time in the rotary-drum continuous blender can be as long as necessary to thoroughly dedust the material without adversely affecting its critical properties.

Sizing the blender

After you've chosen a blender, you need to size it for your application. Begin this procedure by determining your required throughput in cubic feet (or cubic meters) per minute or hour. Then multiply the throughput by your material's residence time in the blender to determine what working volume the blender must have. For instance, a 20-cfm rate that requires ½ minute to dedust the material requires a blender with a working volume of at least 10 cubic feet.

Choosing liquid addition components

By correctly selecting the spray line and nozzle configuration, you can

optimize the dedusting agent usage. This can save money, particularly if you use an oil or emulsion agent, which are more expensive than water.

The right components can also provide more efficient dedusting. If your material readily absorbs liquid, selecting the right nozzle will limit the amount of liquid sprayed into the vessel and prevent overwetting the material. For instance, use an atomizing nozzle for dedusting granular clay in a rotating-drum continuous blender. The nozzle creates a light, atomized fog in the blender, quickly agglomerating the dust. Also be aware that in a blender with a shaft, such as a screw conveyor, there probably won't be enough interior space for a spray nozzle; instead, you can install a liquid addition port in the blender wall. To determine the spray line size and nozzle or port capacity, consider your material feedrate, absorption rate, and liquid spray rate.

A final word

If you're still dedusting with a batch process, or if you're unhappy with your current dedusting results, it can be time for a change. Consider some of the options mentioned here, and contact your blending equipment supplier for a fresh look at the process.

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What's your tip?

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