

ASK AN EXPERT



Segregation prevention

Peter Holman, Holman Engineering

Q For one of the products our plant creates, we use a V-blender to blend a wide range of particle sizes into a free-flowing powder. We're having trouble with unwanted segregation. Should we try a double-cone or ribbon blender to prevent it?

A The first question is when does the segregation take place? It can happen during blending, discharge, or even shipping.

As for changing blenders, when you have ingredients whose particle sizes are widely distributed, then you might get segregation no matter which blender you use. And, unfortunately for you, free-flowing powders tend to be more susceptible to segregation, so changing blenders is actually the least likely solution.

You can use sampling not only to monitor quality but also to discover where the cause of segregation is hiding, assuming it isn't happening in the blender before your eyes. For example, vibration can cause *percolation*, in which the fine particles fall between the larger ones, pushing the larger ones upward. Vibration can happen during discharge into another vessel, but if the blended product is leaving your plant in good condition and turning up in your customer's location segregated, chances are the vibration from truck transportation is the culprit.

If you're seeing a cloud of fines on top of the blend, what you've got is *elutriation*. When an ingredient is dumped from a mixer, larger particles displace the air and go to the bottom of the vessel, while the displaced air travels to the top of the vessel and takes fines along with it.

There are several actions you can take, both before and after blending, to prevent segregation.

First of all, consider your raw material specifications. Their average particle size and distribution may be causing segregation in the mixer. For example, a blend with particles of 65 microns will segregate much more readily than a blend with particles of 10 microns, and blends with particles of less than 10 microns may not segregate at all. You might want to consider whether asking your raw material suppliers for a specified particle size is worth the possible extra cost.

If the cost of that solution is too high for your application, consider pregrinding your ingredients — although this has its own costs in equipment, space, labor, and processing time. If you pregrind your own ingredients, you can preblend several ingredients simultaneously and then grind them, thus saving yourself some time. You must weigh whether higher material, equipment, or processing costs will produce a higher-quality product that will get you more sales and the chance for an increased price.

Your blender can really only go so far, and sometimes your mixture can segregate during discharge. If you can't stop the segregation in the blender, you still have the option of correcting the blend by postgrinding, but it may not be a good option. If you postgrind, you may have to postblend as well. And you'll have to monitor these processes because different particles often feed to the grinder at different rates. They also reduce at different rates. You'll have to decide: Is the extra time and cost of adding two extra steps to your operation worth it?

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