SUPPLIERS' TIPS

What steps can I take to prevent my mixed material from demixing during processing?

To ensure that various powder materials don't separate or unmix during processing:

- Provide proper agitation speed to maintain complete material fluidization and individualizing during the entire mixing cycle.
- Maintain full agitation speed during material discharging out of the mixer's bottom discharge valve.
- Select a mixer design that provides fast and complete sweeping of mixed material to the discharge opening.
- Ensure the mixer has a large and unrestricted discharge valve design.

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The risk for material demixing is extremely dependent on the material itself. Certain properties of the recipe's components give clear hints for demixing risks, for example if mixing components have big differences in bulk density, form and size of particles, and structure of surfaces.

To prevent demixing, the mixer should have an adjustable speed; mixing time should be as short as possible just to realize the necessary mixing effect because after a certain timespan, mixed materials can segregate and lose homogeneity.

The discharge process can defeat good mixing results in the mixer. Material conveying lines and discharge containers should prevent demixing by suitable means. For example, if a mixed material has components with a large difference in bulk density and particle size and gets the chance to roll down a slope angle in the receiving container, components will segregate.

In-house transport must be investigated precisely and chosen correctly because, for example, vibration influences during material transport can cause demixing. If you use pneumatic conveying in your plant, the method must be discussed with experts to have the right conveying speed and line dimensions.

If a material has a predisposition for demixing behavior, standard processing won't lead to a satisfying result. Each single process step must be investigated and adapted to prevent demixing. Rely on experts for each process step.

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To prevent demixing in those instances where further processing steps are required, consider the following suggestions:

Material in free fall. Minimize segregation from material free falling by shortening drop distances for material in chutes.

Material being discharged. Minimize segregation during material discharges from a tank using a mass-flow hopper, a static blender in the cone, or both.

Material being pneumatically conveyed. With a dilute-phase pneumatic conveying system, expand the line size at the destination a few feet prior to the receiver. This will narrow the trajectory range of the different particle sizes. Also, consider dense-phase pneumatic conveying.

Material under compression. Try to avoid processing equipment that could compact the material and form lumps.

Material handled with vibration. If you're unable to avoid vibratory equipment, minimize the amount of energy put into the material because vibration can cause demixing when larger particles separate, allowing smaller particles to migrate to the formed void in the material.

Most importantly, review the process flow and design the arrangement to minimize the number of processing steps prior to completed operation.

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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).