SUPPLIERS' TIPS

How can I select a pneumatic conveying system for my fragile, friable material?

To minimize product attrition, which often occurs when conveying fragile or friable materials, select a dense-phase pneumatic conveying system. Dense-phase conveyors produce relatively lower product velocity than dilute-phase systems do. There are several dense-phase conveyor types, so when you talk with suppliers, make sure you define the exact parameters of allowable product attrition that you'll accept. Once you've narrowed down your choices, make sure the prospective suppliers conduct witnessed lab tests. The test runs must be identical to a normal production run; you should use the correct material and make sure the test simulates actual field conditions as closely as possible. During testing, make sure the suppliers explain everything that occurred during the run. If a supplier doesn't allow you to witness the lab test, don't buy the conveyor; you'll have no proof that it'll work with your material.

Mike Weyandt,
corporate sales manager,
Nol-Tec Systems,
651-780-8600

A smooth or polished conveying system with perfectly fitted joints and slow, plug-flow conveying can be the best choice for handling fragile and friable materials. Make sure the pick-up and terminal velocity are designed specifically for your material's shape, size, and density. In a plug-flow system the conveying air is moving through and over the plugs at a higher velocity than the material is moving, eliminating material degradation. To choose the best conveyor for your material, contact a reputable conveying equipment manufacturer and have them conduct the appropriate conveying tests and system analysis. Make sure you witness the test results to make the most educated decision possible for conveying your fragile and friable material.

Russel Brackman,
technical support manager,
Smoot div. of Magnum Systems,
913-647-6172

Dilute-phase conveyors provide less particle-to-particle interaction than other conveyors, which reduces degradation. However, if you're concerned about degradation, you must address its three main causes: the material's velocity, the angle of impact, and the material's hardness.

To prevent degradation during conveying, your conveyor's pick-up velocity should be as slow as possible while still maintaining a reliable and consistent flow. As your material moves from the pickup point to its destination, the transfer gas decompresses, expanding its volume and thus increasing velocity. A system with a "stepped" line (which includes sections with a larger line cross-section) will allow for overall lower decompression velocities, thus reducing the material velocity. Angle-of-impact interactions occur at the elbow and line receiver. Therefore reducing the number of elbows, using long-radius elbows, and properly designing the destination will reduce product degradation.

Another way to reduce degradation is to use a vacuum sequencing system. The system's cycling reduces the average velocity.

Pat Mahoney,
senior systems engineer,
Premier Pneumatics,
785-825-1611

Properly designed pneumatic conveying systems are a safe, economical, and highly efficient way to move product, but degradation is always an issue with easily damaged materials. Your first step in selecting a system should be to define what level of material degradation is acceptable for your purposes. One measurable way to do this is to decide what post-conveying percent increase in fines passing through sieves of various specific sizes is within your acceptable range.

Next, look for suppliers that offer a range of pneumatic systems. They'll be the most knowledgeable when recommending a system that best fits your needs. For fragile, friable materials, you have two options: semidense-phase and dense-phase pneumatic conveyors. Dense-phase conveying uses high-pressure air to achieve higher material-to-air ratios. This minimizes degradation and abrasive wear by conveying material in relatively slow-moving, tightly packed slugs. Typical line speeds range from 100 to 1,000 ft/min. Conveying air ranges from 20 to 80 psig.

Select a supplier that has the capability to perform full-scale simulations to quantify degradation using various system designs. There's just no better way to confirm how your material will fare when the proposed system is installed then by running a full-scale test with your material that includes the same equipment and line layout planned for your facility.

Dan Pedersen,
applications engineer,
Cyclonaire,
402-362-2000

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 Alicia Tyznik, Associate Editor, Powder and Bulk Engineering, *1155 Northland Drive, St. Paul, MN 55120; fax 651-287-5650 (atyznik@cscpub.com).*