SUPPLIERS' TIPS

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

When selecting a pneumatic conveying system for fragile and friable materials, it would be best to handle these materials in dense phase, either a pressure or vacuum system.

More specifically, in selecting a pneumatic conveying system for a fragile or friable material, you must understand what causes the attrition to take place in the system. Material impact is the primary cause of particle breakage in pneumatic conveying systems. The faster the material is moving when it impacts a surface, the more breakage will occur. The more impacts, the greater the attrition. So, by having a low material velocity and by limiting the number of impacts that may occur, you can reduce the amount of attrition.

Once you understand attrition and its effects, this points to using a dense-phase system where material velocity is relatively low, the opposite of a dilute-phase system. Reducing the number of direction changes (bends) in the system also reduces the number of impacts. To further reduce material velocities, you should select a nonpurge dense-phase system. In this system, the material velocity remains low throughout the convey cycle, unlike a standard dense-phase cycle where there is higher material velocity at the end of a cycle when the line empties. Nonpurge means there is material already within the line at the beginning of the cycle and the cycle is terminated before the line empties again.

Designing a nonpurge system usually requires the use of air injectors (also known as air assists or boosters) along the conveying line. These injectors facilitate the restart of the system with a conveying line full of material at rest.

Todd Husom, bulk material product manager,
Nol-Tec Systems, 651-780-8600

In addition to considering the design parameters of a conveying system for fragile and friable materials, the system can be designed to reduce material impact and shearing based upon component selection and installation. Begin with thinking about how the material enters the system. A rotary valve at the material inlet can shear particles as the valve feeds material into the conveyor, so alternate material pick-up methods should be considered. Once inside the conveying line, even slight misalignment or gaps at conveying line joints can create an unnecessary impact point, damaging the material. The material should flow through the conveying line in as smooth of a manner as possible. Hence, care should be taken during the installation of the conveying line so that joints are cut square and properly aligned.

As material impact on elbows is nearly unavoidable, the number of turns in the conveying line should be kept to a minimum. If the system does have curves, consider a specialty deflection elbow, where the material deflects off of other material suspended in the line, allowing the material to round the bend without coming into contact with the elbow wall.

If the pneumatic system is purpose-built to handle only fragile, friable, or materials with both characteristics, the conveying line diameter can transition from a smaller diameter to a larger one closer to the end of the conveying system. This will reduce the velocity of the airflow prior to it entering the filter receiver. As the material exits the conveying line, a radial entry into the filter-receiver (as opposed to a tangential one) will reduce material impact against the interior of the vessel. As the material enters the receiver, a rubber "curtain" at the end of the conveying line will deflect the incoming material away from the receiver walls. For some materials, lining the interior of the receiver with rubber may be necessary.

Charles Williston, national sales manager,
HammerTek, 800-505-9665

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).