SUPPLIERS' TIPS

How can I select a pneumatic conveying system to handle my abrasive material?

Generally speaking, abrasive materials cause wear, and the higher the velocity in a pneumatic conveying system, the higher the amount of friction and wear. To effectively handle abrasive materials, you must reduce the conveying velocity to a minimum. This is typically done by using dense-phase pneumatic conveying.

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Keeping material velocity low is the key to successfully handling abrasive bulk materials. A properly designed dense-phase pneumatic conveying system will provide this low velocity, as opposed to the relatively high velocity required for dilute-phase conveying. Selecting the proper dense-phase design will depend upon a wide range of factors related to material characteristics, rate, distance, and environment. No single dense-phase system is best for all applications. But once you've selected a design, keeping material velocity as low as possible (without plugging) will deliver optimal results.

When working with a dense-phase system supplier, it's important that you understand how the values for material and conveying gas velocity are derived. For example, if the supplier claims a material velocity of 300 ft/min, ask for an explanation of how this value is calculated. A word of caution here — velocity calculations are far from simple, as the dynamics inside a dense-phase conveying line are complex. Also, ask your supplier if any of their customers handling materials similar to yours would be willing to give a testimonial. This may be the best way to determine if the supplier's system is suitable for your abrasive material and application.

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Dense-phase pneumatic conveying systems are typically deemed the best choice for handling abrasive materials. But keep in mind that true dense-phase systems are material-specific. Materials conveyed in a dense-phase system must have one or both of the following characteristics: The material must be air permeable (meaning that air can percolate through it) and/or the material must be fluidizable (meaning that once you put air to the material, the material becomes water-like). Materials with these characteristics typically have a uniform particle size.

Particle shape is also an important characteristic to consider. Many abrasive materials are abrasive because that's the quality you want in the material. And most desirable abrasives are also shaped to bring out this quality to its fullest. Rough and needle-like materials may have a very uniform size, but they usually aren't permeable or fluidizable. They tend to lock together and not allow any slip between particles. You can add air boosters and keep increasing the system's air velocities to thin these materials enough to convey, but eventually you end up with a dilute-phase system that will wear out very quickly.

So, if your material is fluidizable and air permeable, you have a candidate for a very reliable dense-phase system. If not, save your time and money and look into a mechanical system. A typical dense-phase pneumatic conveying supplier can simply look at a small sample of your material to determine if you have a potential candidate or not. Some suppliers even have a full-scale test lab available for you to visit. Take advantage of this opportunity. During testing, if you can walk down the conveying line faster than the material is moving, the system has great potential. If not, approach it with caution.

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There are two basic ways to move material pneumatically — dilute-phase and dense-phase conveying. In a dilute-phase system, material is added to an air stream that moves the material at a rapid rate through a pipeline. In a dense-phase system, material is filled into a pressure vessel and air is added to the material. A dense-phase system conveys the material at a much slower rate, making it ideal for handling highly abrasive materials. There are many benefits to using a dense-phase system when conveying an abrasive material. One is the low maintenance costs associated with a dense-phase system. For instance, the pipeline components have a greater longevity due to the low velocity of the material moving through them. Also, a dense-phase system has fewer moving parts. In many instances the initial cost of a dense-phase system will be higher, but the savings in worn out parts and maintenance costs to replace those parts will cover that initial cost very quickly.

When choosing a pneumatic system, consider the supplier's experience and the quality and strength of the system components. The supplier's experience plays an important role when designing a pneumatic system. A properly designed system will run very efficiently, while a poorly designed system can see large amounts of wasted air, or, even worse, it may not be able to meet the required tonnage rates. Selecting a system supplier that can properly set up a system during and after installation will greatly increase your system's effectiveness.

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Equipment suppliers are a valuable source of information about equipment and processes. In light of this, we occasionally 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).*