SUPPLIERS' TIPS

What are some tips for choosing a feeder to handle my cohesive material?

A dry bulk materials handling feeder is a simple machine specifically designed to meet a given set of operating parameters or conditions, also known as specifications. To choose a feeder that meets your application's technical specifications, start by asking the following questions:

- What type of cohesive material am I handling? Cohesion is typically defined as a material characteristic of molecular attraction where particles combine to form large lumps or agglomerates. Material characteristics such as crystal shape and structure, plus added ingredients such as solvents, and other factors can cause cohesion. Examine all of your material's properties, including dynamic bulk density; moisture, fat, or oil content; particle size and distribution; and temperature. Look for a feeder supplier that has experience working with your material type.
- What are my application's required feedrates and accuracies? The required feedrate is your minimum to maximum feed range plus a safety margin of ±25 percent. Required accuracies vary depending on your application. Volumetric feeders typically provide accuracies of ±1.5 percent of the feedrate based on a 1-minute sample or 30 screw revolutions. Gravimetric feeders usually provide accuracies of ±0.5 percent of the feedrate. You may also require accurate closed-loop feedback information.
- Does my application require specific construction features? Feeder construction features and options include material contact, finishes, electrical enclosures, inlet and discharge dimensions, and others.
- What are my application's operational conditions? Think about how you'll be refilling the feeder, what type of discharge you'll use, if you'll run the system 24 hours a day 7 days a week, and if feeder reliability is critical to normal plant function.
- What maintenance and running costs are important to me? Feeding systems should be simple to operate and maintain and be cost-effective. Readily available, reasonably priced parts and experienced service personnel are often overlooked when companies accept recommendations and make purchase decisions, but are extremely important when choosing a feeder manufacturer.

A good feeder design will be adjusted to provide the correct hopper volume, screw and tube configuration, materials of construction, surface finishes, and other auxiliary features necessary for your application.

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The two most critical items when choosing a feeder to handle your cohesive material are the hopper's design and the metering auger or cylinder configuration.

A cohesive material can (and will) build up on hopper walls to the point where it either ratholes or bridges, resulting in a decrease in output or no output at all. A properly designed hopper will ensure material flow. Avoid shallow hopper angles. Vertical-walled, negative-sloped, and cylindrical hoppers work best and, when combined with a wide throat area at the hopper bottom, will help minimize material bridging across the feed chamber. Hopper coatings with a low coefficient of friction can also be used. Other options include hopper agitators and vibrators. Use caution when considering these devices, since they can cause some materials to pack and will create problems with performance, cleaning, and even possible drive overload.

A cohesive material will cause buildup on the metering augers, resulting in a decrease in output and possible block off of the entire material flow. Metering augers with less surface area or self-wiping options are available. Exercise caution when using self-wiping augers if the material contains large particles or doesn't react well with shear. Release coatings are also available for metering augers. In conjunction with a properly configured auger, give some consideration to the coatings and clearances of the discharge cylinder.

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There are several feeder options when handling cohesive materials, depending on process requirements, material characteristics, and required feedrates.

For example, there's an important distinction between the material handling capabilities of a twin-screw feeder and a single-screw feeder or auger. Twin-screw feeders consist of two screws that intermesh and co-rotate, forming relatively sealed and forward-moving material pockets. This causes the feeder to act similarly to a positive-displacement pump, first capturing difficult-flowing materials and then forcibly moving them to a discharge point. The screws have the added advantage of a self-wiping action, which helps keep screw surfaces clean and free of buildup. On the other hand, a single-screw feeder handling a cohesive material often flings the material off the screw flights in the outlet tube. The material then sticks to the tube wall and accumulates, eventually producing inconsistencies in the final product. In these cases, using a co-rotating twin-screw design is a better choice. Some screw configurations are better suited than others for handling cohesive materials.

When using a weighbelt feeder in high flowrate or low headroom applications, cohesive materials typically create difficulties in delivering accurate feedrates by depositing on the belt and influencing the weighing results. However, adding a second weigh bridge and correlating controls can compensate for these inaccuracies and help continually tare the belt. This design option provides the highest accuracy while reducing downtimes for maintenance and calibration. In addition, using scraper bars in the weighbelt feeder also helps minimize this effect.

Many feeders have various hopper and agitation methods for handling troublesome materials.

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