

Tips

How to optimize your volumetric feeder's performance

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Here are tips for optimizing your volumetric feeder's performance by finding and fixing feeding problems.

In today's tough economy, the pressure to properly maintain your process equipment, increase the equipment's service life, and ensure that it achieves top performance in your process is higher than ever. In many dry bulk materials applications, optimizing a feeder's performance is key to improving the entire process. A feeder that doesn't feed your material consistently can yield off-spec product and require extended downtime for adjustments or repairs, reducing your production rate and cutting your profits.

This article explains how to track down and fix feeder problems to optimize feeding performance. The information here focuses on volumetric feeders, which operate by feeding a certain volume of material per unit time. (The other major type of feeder is gravimetric, which operates by feeding a certain weight of material per unit time and is typically used in applications requiring high-accuracy feeding.)

How a volumetric feeder works

The most common type of volumetric feeder is a volumetric screw feeder, as

shown in Figure 1. The feeder consists of a hopper, discharge device (the screw), and controller. In operation, the screw rotates at constant speed to meter material at a predetermined volume-per-revolution discharge rate from the hopper to the process. The controller monitors and sets the feeder's screw speed, which determines the material's discharge rate.

Because the volumetric screw feeder can't detect or adjust to variations in a material's bulk density, the feeder is most effective with relatively free-

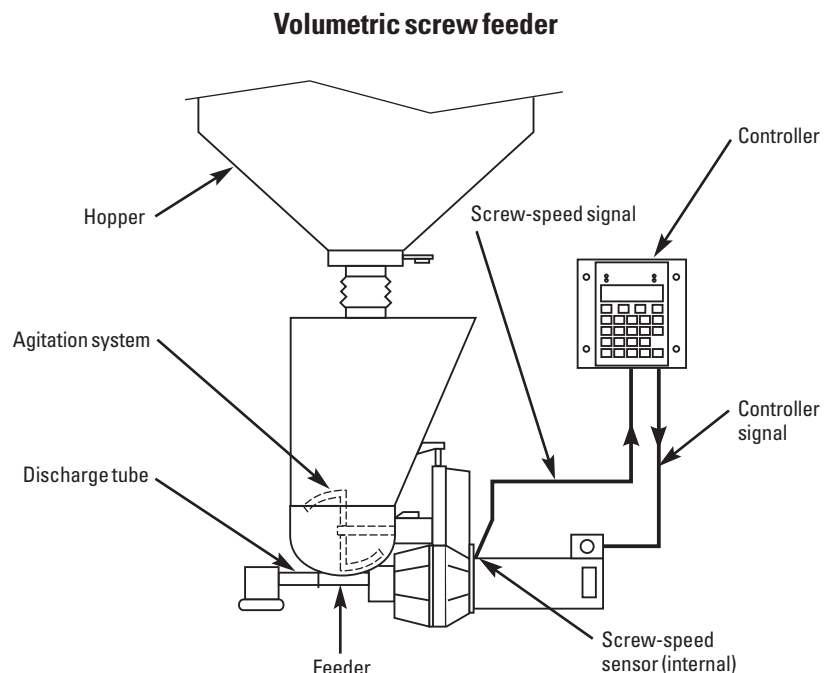
flowing, uniform-density materials, such as pellets.

Achieving optimal feeder performance

If your volumetric screw feeder isn't providing a uniform discharge rate, you can typically trace the problem to one of three sources: a faulty screw-speed sensor, a faulty motor drive, or a change in the volume-per-revolution discharge rate caused by material flow problems in the hopper. Here's what's behind these problems and how to fix them to optimize your feeder's performance.

Faulty screw-speed sensor or motor drive. If your feeder's screw-speed sensor (Figure 1) doesn't accurately register the screw speed (or register it at all), or if the motor doesn't respond as directed by the controller, the feeder won't be able to precisely control the discharge rate. If the feeder is delivering material but the screw speed varies, first check for loose sensor wiring and electrical connections. Then, if these connections are sound, check that the sensor is properly positioned according to the manufacturer's instructions.

Figure 1



If the screw-speed sensor's position is sound, set the controller to operate the motor at a fixed setpoint at approximately the middle of the motor's speed range. If the resulting motor speed is steady and the controller's speed indication is steady, you'll know that the sensor and motor drive aren't the problem's source. If the motor speed or the controller's speed indication isn't steady, you may need to clean or replace the sensor or replace the motor drive.

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Change in volume-per-revolution discharge rate. If the screw-speed sensor and motor drive are operating properly, the problem is caused by

nonuniform material flow in the hopper and the screw's in-feed section or by material buildup on the screw and discharge tube. Either problem will reduce the material volume that the screw delivers in each revolution at a constant screw speed. An immediate, but temporary, remedy is to clean the screw, discharge tube, or hopper, or all three. To permanently solve the problem, you may have to change the screw or hopper design to promote uniform material flow or equip the hopper with a rotating agitator or other agitation system to help move the material from the hopper to the screw.

An ounce of prevention

There are several things you can do to prevent feeding problems and keep your volumetric feeder performing at peak levels. First, consult the feeder supplier to ensure that the feeder you choose can handle your material and process, and then install the feeder correctly in your process. Finally, thoroughly train your operators and maintenance workers to provide ef-

fective feeder troubleshooting and maintenance. **PBE**

For further reading

Find more information on improving volumetric feeder performance in articles listed under "Feeders" in *Powder and Bulk Engineering's* comprehensive article index (later in this issue and at PBE's Web site, www.powderbulk.com) and in books available on the Web site at the PBE Bookstore. You can also purchase copies of past PBE articles at www.powderbulk.com.

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