Regularly scheduled maintenance of any feeder is essential in weighing materials accurately. First and foremost, cleanliness will affect weighing accuracy. Dirt or material buildup will limit scale movement, cause excessive wear of moving parts, and change the tare setting. Clean your feeder on a regular schedule.

Outside scale influences will also cause weighing inaccuracies. Such influences include portable fans or plant air conditioning blowing on the feeder; individuals using the feeder as a storage shelf, workbench, or step; and material buildup on the feeder, which will decrease a feeder's freedom of movement. Check your feeder for any outside influences and eliminate them.

And finally, calibration is key in maintaining weighing accuracy. Inconsistent and inaccurate calibration settings will cause the feeder to begin at an incorrect starting point. To avoid this, tare the feeder's scale weight to zero; check the feeder's weight and correction factor; and learn each material's specific feedrate.

> Ray Kerswill, service technician, AccuRate, 262-473-2441

Check the operation and maintenance manual that accompanies a new feeder. Keep in mind that all feeders are mechanically operated devices, and since they all have moving parts, it's essential that an operator maintain those moving parts. Obviously, the fewer the number of moving parts, the greater the advantage to the operator from a performance, longevity, and maintenance point of view.

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 to have suppliers answer, send it to Jamie Nashban, associate editor, Powder and Bulk Engineering, 1155 Northland Drive, St. Paul, MN 55120; fax 651-287-5650, jnashban@cscpub.com.

SUPPLIERS' TIPS

What kind of maintenance will keep my feeder accurate?

The drive train (the gear reducer, couplings, and motor), the screw itself, and the bearings that support the screw are the most essential parts of a screw feeder and need the most attention. The drive train's parts usually have grease ports — the maintenance manual will advise on greasing frequency. In a normal operation mode and environment (this includes running 24 hours a day, 7 days a week), apply grease every 6 months. By greasing regularly, you'll ensure that the motor and reducer will operate properly, resulting in maintained and repetitive speeds. If you have a jawtype coupling, check the elastomer spider at the same time you service the motor and reducer. A worn elastomer could cause shaft slippage.

Depending on the material you're metering, it's wise to disassemble the feeder periodically and clean the screw of any material that might have adhered to the pitches. If you allow material to build up, the flights won't fill properly, affecting accuracy. If the material is an oxide, which is both adhesive and cohesive, you'll need to clean the screw more frequently than if the material is lime or flour.

A feeder has at least one bearing at the screw shaft's rear, and some of the better-designed units also have a bearing at the discharge end. These bearings are usually sealed and lifetime-lubricated. Some bearings may have grease fittings, but because screw feeders seldom operate at speeds in excess of 165 rpm, you may need to lubricate the bearings only once a year.

Anthony R. Bartello, vice president sales and marketing, Metalfab, 973-764-2000 To keep your feeder accurate and operating properly, keep it clean and free from foreign contaminants that might get in between the tuning springs and other body components. Make sure that the vibration isolators are flexible — old, hard isolators change the unit's tuning and transmit more vibration into the surrounding structure. Make sure that all bolts are torqued to the recommended torque values — they can change the unit's operating characteristics. If maintained properly, vibratory feeders are the most trouble-free feeders available.

> Jim Mitchell, vibratory products manager, Eriez, 814-835-6000

Most feeder accuracy problems can be attributed to improper feeder installation, inadequate maintenance, or changes in your bulk material flow properties, operating conditions, or process requirements. Assuming proper installation and none of the mentioned changes, routine maintenance should keep your feeder running accurately. The maintenance routine will vary depending on the type of feeder you use.

Most problems relating to a volumetric feeder's discharge rate stem from a faulty screw-speed control sensor or motor drive, a change in the discharge rate's volume-per-revolution ratio, and material flow problems from the hopper. Routine attention to these three areas is key.

If the feeder's discharge rate is a problem, first check for loose wiring and electrical connections. If the connections are sound, you may need to clean or replace the screw-speed feed-

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back sensor, depending on the sensor type and the manufacturer's recommendation. You can easily evaluate the sensor's performance if the motor speed is stable.

If the screw-speed feedback sensor isn't the problem, check for material buildup in the screw or discharge tube, or a blockage in the hopper that may prevent consistent material flow to the screw. Clean the screw, discharge tube, or hopper, and if a problem persists, you may have to change to a different screw or hopper design.

There are four key areas to check routinely in a loss-in-weight feeder. The first is the mechanical system itself. (See volumetric screw feeder maintenance above.) Note, however, that since a loss-in-weight feeder functions as a declining weight system, screw buildup or partial blockage will be compensated for automatically until the feeder reaches a flowrate alarm condition. Monitor for buildup or blockage.

The second key is the weight sensor or scale. Make sure that the weighing system is reasonably isolated from the process's vibration environment, air currents, or mechanical disturbances from nearby equipment. Note that some weighing systems provide built-in immunity to such vibration and disturbance. Regularly verify the weight-sensing device's calibration to detect problems such as drift (a gradual deviation from a set adjustment). Note that some weighing devices don't require periodic recalibration.

The third thing to check is the refill device. Make sure that there's no material leakage through the refill device at the hopper's inlet. Continual material leakage into the hopper after the refill process has stopped could produce a feedrate error and create a weight-loss rate change.

Finally, check the feeder discharge. If material discharges into a nonambient-pressure environment, such as a pressurized or vacuum conveying line, a pressure pulse can cause a feedrate error. Check to see that all pressure vents and sealing connections are proper.

The mechanical systems that keep the belt clean cause most weighbelt feeder

problems. Be sure the belt is properly tracked and its tension is maintained. Also, correctly setting the weighbelt feeder's shear gate, which establishes and guides the material flow onto the belt, is critical to accuracy.

Because the weighbelt feeder weighs the material as it passes over the weighbridge's weight-sensing device, you must accurately and periodically tare the weight-sensing device's load cell. This procedure ensures that only the material weight, and not variations in the belt weight, is measured. Some manufacturers offer automatic taring systems that can eliminate or reduce the time to execute this step.

> Kathy Hunter, global marketing director, and David Wilson, vice president, K-Tron, 856-589-0500

Proper torque is one of the most important maintenance concerns for vibrating feeders. Vibrating feeders are tuned, which means there are two mass-vibrating systems with a set of springs between the feeder trough and the drive mechanism. Bolts clamp the springs and ensure that the vibrating action is properly transferred to the feeder trough. If the bolts aren't properly torqued, material won't flow consistently and may result in feeder damage.

Trough liners are another important maintenance concern for vibratory feeders. Over time, abrasive materials wear away at the liner, causing its weight to decrease. This affects the critical relationship between the feeder drive and the trough's mass changes, vibration, or amplitude. As a liner wears, it's important to replace it with one of the same thickness and weight.

Keep in mind that the tuning relationship between the feeder drive and the trough is critical. When a feeder trough is modified, not only is the tuning relationship altered, but the balance between the drive unit and the trough is also altered. Always consult the feeder manufacturer before making any modifications to the feeder trough. Voltage is another critical area to watch. Fluctuations in voltage may cause changes in the power generated by the magnetic coil, which, in turn, will affect the feedrate. There are two ways to control this variable. The first option is to hold the voltage constant before inputting it in the feeder's controller. The second option is to incorporate a voltage regulator to eliminate or minimize voltage irregularities.

Feeders must be free to vibrate without interference. Pay particular attention to clearance around hoppers, chutes, and other infeed and discharge points. Dust seals at the feeder's trough infeed or discharge point must be very flexible. Take care to ensure that they don't restrict vibration.

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