Tips

How to retrofit your circular vibratory screener for top efficiency

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Tired of simply putting up with screening problems? Retrofitting your circular vibratory screener can increase its capacity, eliminate maintenance downtime, improve your product quality, and ensure that the screener meets workplace safety standards. The following tips explain how to retrofit your existing screener with components that will increase your screening efficiency.

A circular vibratory screener is commonly used to scalp, sift, dedust, dewater, or classify particles in up to five fractions using screen mesh openings in the range of 25 microns to 2 inches. This versatile, low-cost screener is simply but ruggedly constructed, consisting of one or more interchangeable screen assemblies, called *screen decks,* each with a frame containing a screen and discharge outlet. Typically, the motor that supplies vibration to the screens is mounted rigidly to the main screen deck and is connected to a double extension shaft whose ends are fitted with variable eccentric weights. Springs support the screen decks on a circular base; the springs allow the screener to vibrate freely while preventing vibration from being transmitted to the floor.

No matter how effectively your circular vibratory screener separates your material when it's first installed, over time your material's characteristics and application requirements may change, leading to various screener limitations. For example, material changes can cause screen blinding, flooding, particle degradation, or related problems that increase maintenance requirements. Static electricity may cause your material to agglomerate. Increased throughput requirements may now exceed your screener's capacity. Or perhaps your particle size tolerances have tightened, demanding more exacting separations than your existing machine can provide. Here are some ways you can retrofit your screener to overcome these limitations.

Adding antiblinding devices and grounding the screen deck

Your material may clog (or *blind*) the screens if the material is resinous or fatty or contains matted or interlocked fibers, the coarse particles are very near the screen mesh-opening size, or the particles are electrostatically charged. Once you determine the blinding problem's source, prevent it by using one of these approaches:

Adding rotating nylon brushes or rubber wipers on the screen's top surface. These brushes or wipers combine a wiping action with shearing to remove resinous or fatty materials and matted fibers from the screen surface.

Adding hollow cylindrical rings supported on a perforated plate just below the screen. By repeatedly contacting the screen bottom as the screen vibrates, these rings dislodge particles wedged in the mesh openings and eliminate blinding. The rings' upper edges apply a shearing force to fibrous materials that protrude through the mesh openings, providing some relief from fibrous particle blinding.

Adding rubber balls on a lower ball screen within the screen frame. Incorporating a large number of rubber balls on a lower screen under the operating screen in a screen frame provides high-momentum impact on the operating screen, releasing near-size particles wedged in the mesh openings.

Grounding the screen deck. By grounding the screen deck, you can eliminate blinding by electrostatically charged particles and keep them flowing through the screen.

Adding capacity

Your screener's actual screen surface area (that is, the exposed screen surface area not blocked by the frame or other screen deck components) can limit your screening capacity, slowing the material's passage through the mesh openings. You can increase capacity by replacing one or more existing screen decks with a high-capacity deck whose frame contains two screens, thus enlarging the actual

These rubber balls work as antiblinding devices, bouncing against the bottom of the screen to release near-size particles wedged in the mesh openings.

screen surface area without increasing the screener's footprint.

Various proprietary versions of these high-capacity decks are available from screener suppliers. One type has an upper screen with the same diameter and mesh-opening size as the lower screen, effectively doubling your actual screen surface area at nominal cost and speeding the passage of material through the screens. This deck uses the same standard screen type as your screener's other decks.

Another type of high-capacity two-screen deck has an upper screen with the same mesh opening size as the lower screen but a *smaller* screen diameter. This allows material that doesn't pass through the upper screen's mesh openings to quickly discharge all around the screen's periphery onto the lower screen for screening, while material that passes through the upper screen is funneled through a hole in the lower screen's center to the screener's discharge outlet. This deck can increase your screener's capacity by 60 to 160 percent. The screens for this deck must be designed especially for this application; if your plant already stocks a large inventory of standard screens for your screener, it may be more practical to use the first option, the two-screen deck with standard screens.

Another situation where retrofitting a screen deck can increase your screener's capacity is when a deck's discharge spout can't discharge on-size material quickly enough, causing material to back up on the screen. In this case you can replace the screen deck with one that has a 360-degree peripheral discharge, which is a round auxiliary discharge frame integrated into the deck's periphery. On-size material that doesn't pass through the screen will discharge over the screen edges into the 360-degree discharge, which directs the material onto the center of the next screen, keeping material from backing up on the upper screen and maintaining a single-particle depth on the screen to increase screening efficiency.

Adding an extended spout

If the material discharged from your screener flows to a short conveyor for transfer to downstream process equipment, a bin, or a drum, you can save time and eliminate potential material transfer problems by installing an extended spout at each screen deck discharge to direct the material right to its destination.

Adding an adjustable feed control

You can avoid overfeeding and flooding problems by retrofitting a flow-control device that will control your material's flowrate to the screener. Various proprietary devices are available from screener suppliers; consult your supplier to determine which device will work with your screener and provide the flow control you need.

Adding a vibration amplitude gauge

Your screener's vibration amplitude significantly affects screening efficiency, and the unit's top and bottom eccentric weights are adjustable so you can set the vibration amplitude for maximum screening efficiency. The problem is that once you set the optimal vibration amplitude, there's no obvious way to tell whether someone has tampered with the setting.

The no-cost solution to this problem is to ask your screener supplier for an adhesive label printed with an amplitude gauge that you can attach to the screener. By checking the gauge during screener operation, you can instantly read the machine's horizontal and vertical stroke and check the vibration amplitude against the gauge. Once you determine the ideal vibration amplitude, you can record and post this data. This will simplify periodic amplitude rechecks to ensure that the weights haven't shifted or been tampered with. You can also use the gauge to check the vibration amplitude when you start separating a new material in the screener.

Adding a safety switch

Keep your maintenance workers from being injured when inspecting and servicing your screener by adding a safety switch to the unit's motor access door. The switch prevents a worker from opening the door when the screener is running or coasting to a stop, and it can be wired to automatically stop upstream feeding devices. This prevents the screens from being damaged by overloading and enables the screener to be restarted without a load.

Getting advice

Don't live with your screening problems. If you're not completely satisfied with your circular vibratory screener's throughput or operating efficiency, take the time to discuss the problems directly with your supplier. The supplier can help you find ways to retrofit your screener to ensure that it provides the screening throughput, product quality, and safe, reliable operation you need. **PBE**

For further reading

Find more information on vibratory screeners in articles listed under "Screening and classifying" 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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