Overcoming Static Problems in your Vibratory Screen Separator
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The author describes various approaches to overcoming static problems and increasing efficiency.

Particles that carry electrostatic charge are difficult to process in commercial vibratory screen separators. Static can cause screen blinding and significantly reduce the efficiency of your vibratory screen separator. While there are no hard and fast rules for overcoming static problems, this article discusses several approaches you can try.

If you suspect that electrostatically charged particles are causing screen blinding and preventing your vibratory screen separator from achieving optimum efficiency, there are several strategies to consider. First, you must establish that electrostatic charge really is the cause of your blinding problem. Start by checking with the manufacturer of your separator to determine if your throughput is reasonable for the material being separated, the size or the machine, and the gyrator frequency.

Once you establish that static is the cause the second step is to determine (a) if static is causing the material to cling to the screen, or, (b) if static is causing the material to agglomerate so that individual particles cannot break loose to pass through the screen openings. Electrostatically charged particles are often attracted to the screen media, reducing the apertures and limiting screening efficiency and production. Charged particles may also be attracted to one another so that particles much larger than an individual particle act on the screen surface.

If material clings to the screen

Typically, the design of a circular vibratory screen doesn't take static problems into account. In a normal assembly, a rubber gasket isolates the pretension screen (Fig 1). The gasket prevents the electrostatic charge that accumulates on the wire from draining, retarding throughput and creating a potentially hazardous situation.

To correct this condition, you can place foil strips in contact with the tension ring of the mounted wire and wrap the ends back over the outside of the gasket (as shown in the illustration). This electrically connects the wire media to the outside frame, which can then be grounded. With circular vibratory screening machines that use nonmetallic spring supports, the grounding connection must be made from the free body to the ground. If the machine is in a hazardous location, the grounding connection should be made from the stationary base as well.

If the particles build up to a uniform thickness on the screen wires (Fig. 2), you can replace the screen with one that has larger openings. For example, suppose a machine with a 200-mesh screen is used to separate epoxy powder. The particle buildup reduces the aperture from 74 microns to 44 microns. Because this occurs uniformly and continuously, the 200-mesh

Fig. 1 Normal rubber gasket assembly vs. rubbers gasket with metallic foil assembly.

Fig. 2 Uniform sized particles clinging to a screen. If (a) the particles are of uniform size and, (b) they cling to the screen in such a way as to leave uniformly sized openings, then the required separation can be achieved by using a screen with larger openings.
screen is replaced with a 140-mesh screen. The buildup reduces the 105-micron openings to about 75 microns, which is the opening that was originally needed. However, you must be careful with this technique; if the buildup on the wire is inconsistent, oversize particles will pass through the screen.

If material agglomerates

You can try to condition the atmosphere in the machine to drain the charge from the particles. Commercial ionizing devices sometimes eliminate or reduce the electrostatic charge before the particles enter the separator. These devices operate by ionizing the air that surrounds the particles. Finding the right electronic space ionizer for your situation, however, will require some experimentation.

Generally, the most severe electrostatic charge is carried by finer particles. Coarser particles carry less charge and also perform a scouring action on the screen surface. With multistage separations, there may be some advantage in doing the fin screening stage first. This way, the coarser particles scrub the screen surface. Humidity also helps. Electrostatic charges are more noticeable and troublesome during the winter than during the summer. This is because relative humidity is greater during the summer; the particles absorb some humidity and become slightly conductive, which helps draw off the charge. Exposure to water vapor by bleeding steam into the system may be sufficient to create a humid atmosphere. When applicable, the use of ammoniacal humidity enhances the conductivity, but control can be a problem.

It may take several trials to find the right amount of humidity to solve your static problem without creating new problems. The main concern when supplying a humid atmosphere is the prevention of condensation, which can cause the powder to become damp and create other screening problems. Compared with other charge dissipation methods, however, the creation of a humid atmosphere is an inexpensive technique, even if moisture must be driven off one of the separated fractions.

Another approach is mechanical deagglomeration. A radial arm wiper (Fig. 3) or brushes can be used to break up agglomerates at the screen surface, permitting individual particles to pass through the openings. Or, rings or balls can be placed underneath the screen to add impact and break up clumps, islands, or agglomerates caused by static electricity.

Trying a different type of screener

Many electrostatic charge problems can be overcome with a centrifugal sifter, which uses rotating paddles close to the screen to break up electrostatic agglomerates. The centrifugal force then propels individual particles through the screen openings before they reagglomerate.

Centrifugal sifters are also hindered by the electrostatic charges of particles, but not to the extent of other screening machines. The mechanical agitation at the screen surface provides optimal results, particularly if the product discharge line leads to a vent. Air entering with the feed flows through the screen, carrying the particulates with it.

When the sifter uses a monofilament screen, screening can sometimes be enhanced by soaking the media in quaternary ammonium salt solutions (common antistatic solutions found in household detergents) and drying
The coating increases the media fiber's conductivity and provides greater screening efficiency. It is effective until worn off by the particles passing through the media.

Often the balance of forces in the sifter will cause the product to coat the monofilament media, but only to an equilibrium thickness. The electrostatic force is strong enough for the product to coat the media, but not strong enough for the product to continue coating in the presence of the high mechanical forces acting to wear away the coating. When this occurs, try replacing the screen with one that has larger openings to improve capacity without losing efficiency.

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