Mesh blinding is one of the most common problems in any screening operation. This article discusses how blinding occurs and discusses pros and cons of devices that can help avoid the problem.

**PROS AND CONS OF ANTIBLINDING DEVICES**

Blinding of screen meshes is by far the most common problem that occurs for companies that have purchased conventional screening equipment. Screen mesh blinding, as shown in Figure 1a, is what happens when individual particles of a material being screened or sieved settle into and get stuck inside the holes of the screen cloth, preventing any other material from passing through the holes. (Figure 1a shows a blinded screen while 1b shows the screen in its pristine state.)

Screen blinding results in very low screening efficiencies, slowed rates of production, and processing system downtime needed to clean the screen and rerun the material. Additionally, a blinded screen is likely to rip, causing another series of problems.

The key to efficient screening — no matter what type or size of material you are sieving at — is keeping the screen cloth clean and the physical holes open. First and foremost, you need to keep an eye on the layer of material on the screen. If the layer begins to build up and the material feedrate isn't adjusted, then blinding is likely occurring from an overload. This is the worst thing you can do to a screen. However, even with a good (correctly sized) layer, screen blinding can still occur because many materials tend to either peg into or coat the screen cloth. Note that these processes may not happen immediately. When using vibratory screeners to separate fine powders, for example, the question isn't *if* blinding will occur but *when*. Usually, this blinding will not appear during a 3- to 5-minute testing process. The plugging can take hours, days, or even weeks to develop. The best, most effective way to prevent blinding from occurring is to get ahead of the problem by stopping the particles from ever clogging the mesh holes in the first place. Once the particles are stuck in the screen or mesh, getting them out is very difficult. And once the wires are coated, the situation only gets worse. Eventually, the holes close.

**Antiblinding device options**

Most screen machine manufacturers recommend the use of screen-cleaning, or antiblinding, devices. Examples of these include balls, brushes, or sliders. Balls and sliders sit on a tray below the screening surface and physically hit the screen from below to knock the material particles out of the mesh openings.

**FIGURE 1**

Images of blinded and unblinded screens.

a. Blinded screen

b. Unblinded screen
Brushes also sit below the screen mesh and poke particles out of the mesh. Each of these devices work well for some processes — especially on coarser screen sizes. The devices carry some risk as well. They’re limited in ability and unable to clean the entire screening area. Also, these devices degrade and need to be replaced periodically. Particles that may come from the devices’ wear can end up in the material stream, contaminating the product. Generally, when screening above 500µm (30 mesh), balls and sliders or a combination of the two can typically carry enough energy to keep the screen cloth clean. Brushes work exceptionally well on spherical materials but can also degrade and get into the product stream.

An air-cleaning system is available on tumbler screeners and a turbo model. The air-cleaning process duplicates the working of an air-jet sieve where a rotating arm under or behind the sieve blows a jet of air through the screen to dislodge particles from the screen mesh. A slight vacuum pulled from the fines discharge prevents the material from fluidizing and assists in throughput. These systems are great for lightweight materials and also for dedusting. The downside is that the additional equipment needed for the process — a baghouse, a cyclone, rotary airlocks, and blowers — can make air cleaning a complicated process.

Ultrasonic systems, which send a high frequency–low amplitude pulse into the screen, are another antiblinding option. The pulse loosens up lodged particles and allows them to flow through or across the screen mesh. Ultrasonic screeners are very common and have advanced the sieving industry significantly. The main problem with them is that they require either a slower feedrate or a shorter dwell time because the screen is very susceptible to being overloaded. The lack of amplitude limits the deblinding ability, and the high frequency, alone, will not be able to clear all materials. This is especially true for metal powders or other dense materials. These heavy materials can overcome the energy of the ultrasonic pulsing and then lodge in the screen or mesh hole.

While rescreening is costly with ultrasonic machines, the cost increase has to be considered against the added increase in efficiency. Evaluating these benefits is essential to understanding the advantages of more advanced antiblinding methods.

A step beyond ultrasonics is the multifrequency device. This technology sends both frequency and amplitude up into the mesh from underneath it. This energy will fluidize and stratify the material across the entire screen surface, knocking particles out of the holes and preventing material from sitting on the screen mesh and settling into openings. Multifrequency technology also knocks powder off the screening wires before it has a chance to stick and bind.

There are a number of ways machines transfer energy to the screen, but multifrequency screeners are one of the best alternatives to ultrasonic and other screen-cleaning devices. A combination of ultrasonic deblinding and amplitude sends high energy to the screen from underneath. This allows for high screening efficiencies at high throughput rates. The combination is especially effective on heavy, dense materials such as metal and glass powders. Separations as fine as 10 microns and efficiencies as high as 99 percent are consistently achievable.

This kind of energy doesn’t perform well on coarse powders or rubbery materials, however, as the material jumps around so much that it doesn’t settle into the hole opening. Furthermore, the energy in multifrequency screening may cause unwanted or misshapen particles to fit through the screen mesh. This can lead to the appearance of oversized particles in the undersize material fraction. Angular or high aspect pieces that fit through the holes in one direction but wouldn’t fit on the other tend to stand up on their side and make their way through the screen mesh. While the material can physically pass through the micron opening, laser diffraction systems may see these particles as oversized, leading to an inaccurate reading. A quick sieve analysis can help determine if there are true oversized particles in the material stream.

There is no one screen that is good for all applications. Nature determines whether vibratory or gyratory machines will do the best job. Shape, density, and composition will be factors in choosing which cleaning device is best for your material. Working with suppliers that have test centers can help you find the best screening solutions for your needs. PBE

For further reading

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