The Best Way To Clean Your Screen

By Greg Brock

Screen blinding occurs when screen mesh openings are blocked or closed by the material that is being screened. Near-size particles become trapped or build up on the wires, effectively blocking the screen openings preventing further material from passing through the screen. This is a common screening problem that can be easily fixed with screen-cleaning devices. This article reviews the most common methods of screen deblinding.

Sliders

The most common self-cleaning device is the slider. Slider rings are loose rings that slide directly beneath the screen surface on a slider support surface, which is normally a perforated metal plate. The rings are bounced vertically into the screen mesh by the separator's vertical motion as they travel radially around the screen. The sliders are activated by the motion of the separator without additional driving force.

Sliders work especially well on fine mesh because of the low impact energy and the shearing wiping action that cleans the screen openings. Sliders can be used in both wet and dry screening applications.

Sliders work by four different methods depending on material properties:

- Vertical separator motion impacts the slider ring on the bottom of the mesh dislodging trapped near-size particles from screen mesh openings, effectively cleaning the screen and opening the mesh for the next particle.
- The slider shears or breaks protruding hard or friable materials into smaller pieces, which flow through the screen clearing openings.
- If the material is soft and pliable, sliders can help the material through the screen openings.
- If the material is fibrous, the sliders' horizontal scrubbing motion across the bottom of the screen can dislodge trapped fibers from the screen openings to improve throughput capacity.

Sliders are not efficient for materials that tend to ball up or agglomerate inside the sliders. They can also generate minor amounts of heat, which can fuse temperature-sensitive materials. Moreover, sliders may not perform well on extremely hard, irregularly shaped materials, which can partially protrude through the screen opening and stop slider motion.

Slider clusters work on essentially the same principles as slider rings. The difference is size-clusters are four to eight times larger then a slider ring. Slider clusters are normally used for large-diameter machines to ease maintenance. The impact force

is higher due to the larger weight and size, but there are fewer impacts due to the reduced number of clusters.

There are mixed reports on whether individual sliders or larger slider clusters are a more effective self-cleaning method. The effectiveness is governed by the material being screened.

Ball Trays

Rubber balls are the second most utilized screen-cleaning method, but can only be used for dry screening. Generally 1-3/8-in. in diameter, the rubber balls are supported by a second coarser mesh 2 in. below the classifying screen mesh. A higher vertical separator motion is required to activate the ball cleaning action because they must be thrown up against the bottom of the screen.

With a more powerful vertical motion and heavier weight, the balls impart more energy to each impact when compared to sliders or clusters. As a result of the higher impact energy, the balls are generally used for coarse meshes, which can withstand a higher impact energy. This method is not recommended for fine meshes because they can potentially be damaged.

In contrast, balls are very good at cleaning near-size irregular-shaped particles wedged in mesh openings, as well as shear-sensitive materials in which smearing or balling agglomeration can occur. Balls are not recommended to clean fibrous materials because there is no shearing action to dislodge fibers from the mesh.

The disadvantage of ball trays is that the balls radially spread to the periphery of the screen. This generates quality cleaning action at the screen edge, but can leave the center unaffected.

Sandwich Screens

Sandwich screens are made by bonding a classifying mesh to the top of the screen tension ring, in addition to a coarser support screen mesh to the bottom of the ring. This creates a sandwich with screen-cleaning devices floating between meshes, which can improve cleaning action, therefore decreasing maintenance costs and noise levels.

Cleaning action is improved because sliders are more active bouncing off the bottom mesh than a standard perforated metal plate. The bottom mesh acts more like a trampoline, launching cleaners into the mesh more efficiently. The construction also locates the cleaners closer to the classifying mesh, which allows a gentler vibratory motion to provide better cleaning action.

Screen and motor life increase because the improved cleaning efficiency of sandwich screens requires less vertical vibration amplitude than standard sliders and balls. Maintenance costs are further reduced with enhanced screen and motor life, and screen changes are quicker with the cartridge design of sandwich screens.

Sandwich screens permit the combination of smaller balls inside each slider, which can yield better results than sliders or balls individually. The sliders provide

complete coverage of the screen surface, and a ball inside each slider holds the balls in position for ball cleaning action across the entire screen. The smaller balls yield the ideal impact energy and can be used on fine meshes.

Sandwich screens can be used for dry or wet screening, plus they can be fabricated with metal or synthetic meshes. Sandwich bottom screen meshes are much better for wet screening because liquids cannot build up. Finally, sandwich screens are quieter, decreasing noise levels.

In addition to the bottom-side self-cleaning methods, there are additionally top-side cleaning devices residing on top of the classifying screen mesh. These can be divided into three classifications: brushes, wipers and dams.

Top-Side Rotary Brushes

Top-side rotary brushes are well-suited for clearing fibrous materials, which tend to mat on top of the screen and block mesh openings. The materials move around the screen diameter propelled by the separator's vibratory motion-without additional driving motors. The brushes can expose screen openings, so that the fiber balls can be discharged from the top of the screen and out of the spout.

The disadvantage to top-side brushes is the bristles, which can be lost in product streams.

Top-Side Necklace Ring Dams

Top-side necklace rings create a radial edge dam to keep materials on the active screen longer. The longer some materials are on the screen, the higher the capacity throughput, which can increase the yield of smaller machines to match the capacity of larger machines.

Top-Side Wiper Rings

Top-side wiper rings provide the same radial edge dam as a necklace, plus add a wiper to improve capacity with an additional shearing action. This shearing action can wipe fatty materials through the screen mesh, or break up friable clumps to improve capacity or reduce loss. The disadvantage to top-side wipers is that they slow or impede material flow through the machine. Materials that tend to ball up should never go through a top-side wiper.

Vibro Rims

Vibro rim screens are made by inserting metal ball bearings inside the hollow screen tension ring. The balls create a secondary vibrational energy by impacting the screen tension ring when moved by the separator's vibratory motion. That impact energy transmits through the ring to the screen mesh, and excitation helps clean the radial edge of the screen. This is good for synthetic meshes in which unacceptable wear and damage can occur from sliders or balls, while the disadvantage is that only the outer 2 in. of the screen can be excited and cleaned.

Water Sprays

Water sprays clear screen mesh openings, help eject solids, and keep slurries from drying out and building up inside separators. Another spray advantage is that there is no contamination from slider, ball or brush materials. The disadvantages of liquid

sprays are their cost and potential dilution of products.

Stationary spray nozzles are ideal for cleaning mesh openings and washing fine particles from oversized solids, yet rotary spray nozzles are well-suited for deblinding and ejecting fibrous or lint types of materials.

Ultrasonic

Ultrasonic screen cleaning uses vibrational energy generated by an ultrasonic frequency transducer attached to the metal screen mesh to generate the screen-cleaning action. Ultrasonic-assisted screening is designed for high-accuracy screening applications in which particle sizes approach that of the mesh opening. Ultrasonic energy breaks down electrostatic charges and surface tension, which agglomerate particles and prevent efficient screening.

The ultrasonic vibrational amplitude is 0.000005 in., occurring at a frequency of 35,000 times per second. The lower amplitude and increased frequency means that the particle lands on the screen openings approximately 1,000 times more often than a standard separator vibration, thus increasing the statistical chances that the particle goes through the mesh opening.

Ultrasonic screen cleaning is the most expensive separation process: Equipment costs can run 10 to 20 times the cost of sliders, while the consumable screen costs are four times the cost if a tension ring re-screening program is in place. Therefore it is only used on high-value materials and difficult screening operations, which cannot be accomplished efficiently by any other method.

Energizer

The energizer is a pneumatic screen vibration generator that can operate at frequencies and amplitudes between ultrasonic motion and standard round separators. These energizers can be used on both synthetic and metal screen meshes.

Multiple transducers produce a more uniform vibration across the entire screen surface, even on large-diameter screens. These pneumatic generators do not use electrical energy, and only simple mechanical maintenance is required.

Screen-Cleaning Methods Summary

- Sliders and slider clusters are the most common screen deblinding method for the majority of wet and dry vibratory separator processes.

- Ball trays are used for coarse-mesh dry screen cleaning.
- Sandwich screens generate more efficient screen-cleaning action than sliders on perforated plates or ball trays.
- Screen-cleaning devices on the top side of the screen are less common and used for more specialized cleaning.
- Liquid spray-cleaning methods are used for wet screen blinding issues.
- Ultrasonic screen cleaning is a high-frequency device, which is very effective, but limited by the higher process cost.
- Pneumatic screen energizer systems yield the benefits of high-frequency

excitation at a lower cost.

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Links:
[1] http://www.sweco.com/