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KEY CONSIDERATIONS IN SELECTING SCREENING EQUIPMENT

by W. Nash McCauley, Marketing Development Manager, ROTEX INC.

As shot peening becomes more widely used in military, aerospace and automotive applications, there is increased emphasis on better control over media size. Producing and maintaining media that complies with specified size classifications requires screening equipment than can produce accurate separations. Selecting screening equipment to meet these demands requires an understanding of screening including key items such as screen motion, blinding control and screen clothing selection.

The screening process is affected by many factors, the most important of which are:

1) Type of Screening Function.

There are basically three types of screening functions: scalping, grading and fines removal. Scalping removes a small amount of oversize material (less than 5%) from a feed predominantly less than half of the size of the scalping deck opening. Scalping is therefore an easy separation and capacities are very high.

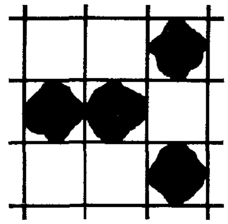
Grading separates material by particle size using single and multiple screen surfaces. These separations can be coarse (larger than 4 mesh), medium (4 mesh to 48 mesh), or fine (smaller than 48 mesh). Grading capacities vary and depend on the particle distribution of the feed, separations to be made and the required accuracy of separation to meet product specifications. Grading is the most difficult of the three screen functions.

Fines removal separates a small amount of fine material (less than 10%). Capacities for fines removal are significantly greater than those for grading but not as high as those for scalping.

In producing and controlling media size, two screening operations are utilized. In the production of both shot and grit media, grading and fines removal screening functions are used. When a screener is used in the peening or blasting circuit, only scalping and fines removal functions are employed.

2) Particle Distribution.

The characteristics of the material to be screened are fundamental to selecting process screening equipment. Perhaps the most important characteristic is the particle size distribution of the feed material as determined by sieve analysis. Sieve analysis provides several clues to the expected screening performance particularly with regard to nearsize particles - those particles close in size to the desired separation. The greater the amount of nearsize particles the more difficult the screening separation for a given accuracy. In addition, when nearsize at the desired screen opening exceeds 25%, screen blinding becomes a major consideration.



Plugging of the screen is caused by "near-size" particles, those which are very close to the size of the screen openings themselves.

FIG. 1

3) Particle Shape.

The other important material characteristics which affect screening performance is particle shape such as granular, flaky, spherical, elongated, sliver like or irregular. Spherical particles, such as shot, screen well as long as the separation does not take place in a concentration of nearsize particles. In this case, because the spherical articles are nearsize in every dimension, they can become lodged in the opening regardless of alignment at which they enter the opening. This produces a blinding problem.

By contrast, irregular shaped particles such as grit generally screen well. However, blinding problems can occur in the nearsize range because the elongation can cause particles to wedge into the opening.

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***KEY CONSIDERATIONS** continued from page 1*

Against this background of factors which effect screening, we can now take a look at the screening process.

Types of screening motion:

1) Vibratory.

Round, square or rectangular units use a high speed short amplitude motion to convey material by either inclining the vibrating surface or using a multiple weight rotating motion. Vibratory action imparts both vertical and horizontal motion to the particles reducing the frequency with which the material contacts the screen openings - a condition necessary for efficient pass through of material. Thus vibratory screens provide good capacity for scalping but are limited on efficiency of separation particularly for the finer separations.

2) Gyratory.

These screeners employ fully circular or a combination of circular and reciprocating motion on a near horizontal screen deck. This motion imparts little or no vertical action to the material and is generally accepted as the most effective screening motion where efficiency and accuracy of screening are required.

3) Revolving.

A drum or reel with an outside surface of perforated plate or wire screen. The effective screening area is only a small arc of the cylinder so these units have limited capacity and low efficiency of separation.

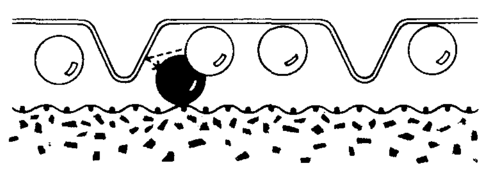
Blinding Control:

Screen blinding is any condition such as plugging, coating or bridging that reduces the open area of the screen surface. Blinding can be cumulative or non-cumulative. Cumulative blinding eventually leads to total blockage of all screen openings and the complete loss of screening function. Non-cumulative blinding, however, is a stable condition where only a certain percentage of openings are blocked at any given time. As one set of openings are cleared another set becomes temporarily blocked and the process continuously repeats itself.

To prevent blinding, it is sometimes possible to use a different size screen opening to shift the separation away from the concentration of nearsize. However, this can result in a loss of screening accuracy which means not meeting product specs. The best solution is a mesh cleaning system that ensures rated capacities without sacrificing screening accuracy. There are many anti-blinding devices that can be used to control or prevent this condition, including bouncing balls, brushes and wiping rings. The selection of an anti-blinding device depends on the type of screening motion and the nature of the blinding to be controlled.

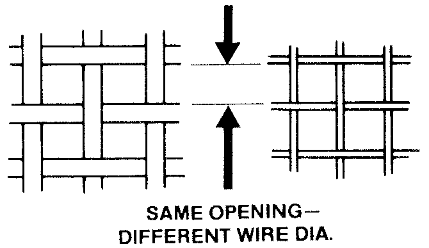
Screen Clothing Selection:

For a given screen opening the diameter of the wire can dramatically effect screening performance. For a given screen opening a range of wire diameters is usually available. Heavier wire will last longer but has less open area and a greater tendency for blinding. Lighter wire provides greater open area with less blinding but is not as durable. In most screening applications including materials finer than 4 mesh a commercial mill grade or stainless steel light wire series screen provides the best combination of capacity, durability and efficiency.



ROTEX Screeners effectively control screen blinding through a system of bouncing balls confined in pockets beneath each screen surface.

FIG. 2



A heavier wire screen lasts longer than a lighter wire screen having the same opening. But a lighter screen blinds less easily, and can handle more throughout since it has a greater percentage of open area.

FIG. 3

In summary, not all screening motions provide the same screening results. This becomes an increasingly important consideration as the screening requirements become more demanding as is the case when specifications are tightened. This is particularly true when screening finer materials. When selecting screening equipment for a specific application, it is best to conduct tests in the vendor's laboratory to confirm that the recommended screening action will produce the desired results.