

Choosing the Proper Vibratory Screener Enables Precise Material Separation and Sizing Control in Dry Bulk Applications



Bulk Material and Powder Screening and Scalping

A vibratory screener is a piece of equipment used to separate materials by particle size, remove small amounts of oversized materials from fine material or remove excess liquid from finished products. Screeners are used in industries as diverse as food, pharmaceutical, chemical, coal, minerals, wood pelleting, asphalt and many more. Using gravity and motion and along with mesh screens, these units perform the work of several people in a fraction of the time.

Manufacturers like Cleveland Vibrator Company offer multiple vibratory screeners to handle separation and sizing of materials, or removal of unwanted materials from a batch. These durable and cost-effective units are usually custom built using a variety of screening media with screen openings ranging from 20 micron to 4" depending upon the product.

Linear vibration—achieved with two synchronized vibrator motors or a single pneumatic vibrator—helps these industrial-type screeners reach peak performance

with minimal downtime. Screeners built with pneumatic or electrically-powered vibrators are available in single, double or triple decks, again depending upon the size and composition of the material. Models with pneumatic vibrators can be used for handling hazardous or explosive materials. Hazardous rated electric vibrator motors are also available.

Specifying the right vibratory screener involves making sure the manufacturer understands the production goals and is supplied with complete application data, which includes information such as material type, top particle size, particle shape, application type (wet or dry) and the method of material feed. Some of the more detailed information a manufacturer needs is the following:

- Maximum feed rate in lbs/hr, tons/hr or metric tons/hr
- Bulk density of the material to be screened in lbs/cubic foot or Kg/cubic meter

Choosing the Proper Vibratory Screener

Technical Article

- Screen opening(s) required to make the specific separation(s)
- Sieve analysis (particle size distribution or gradation) of the feed material
- Percentage of moisture in the feed material
- Type of screening media preferred, i.e, woven cloth, perforated plate, urethane, grizzly bars, profile (wedge) wire, etc.

TYPES OF VIBRATORY SCREENERS

Different applications require a specific type of vibratory screener to ensure a seamless fit into an existing production process. There are formulas to help select the proper size of the vibratory screener and it's best to work with a manufacturer that understands the complete parameters of the application. The following are some of the more popular types for industrial and commercial applications:

- **Air-Powered Screeners** are primarily used where simple, economical control of the feed rate is desirable. These screeners are recommended for a hazardous-duty area instead of more expensive electric alternatives. They are excellent for screening bulk materials such as powders, plastic pellets, aggregate or scrap metals.
- **Electromechanical Screeners** with twin motor drives are designed for precise screening where high efficiency is required in the end particle size. These units are mounted horizontally, requiring no gravitational assistance. Options include lower frequency, higher amplitude drives for light density, fluffy products or for large screen openings
- **Gravity Flow Screeners** feature a design that is down sloped 20 degrees for gravity-assisted product flow, using a single rotary electric vibrator drive. These screeners are most suitable for scalping or removing a small percentage of oversized and/or tramp material and are ideal alternatives for screening powders, pellets, aggregate or scrap metals.

- **RSM Series Volumetric Screeners** are compact, self-contained units incorporating a bulk supply hopper with a vibrator and vibratory screener or scalper. The all-in-one unit makes it efficient to easily dump materials or get a controlled and uniform product flow. These units are used for simultaneously screening or scalping bulk materials while feeding into bins, hoppers, packaging or conveyors. They are also available with the hopper integral to the vibratory screener body (so it also shakes) for a lower overall profile or for poor flowing materials.
- **Portable Sloped Screeners** offer assistance for bulk material where portability is necessary. This gravity-assisted design using a single rotary electric vibrator ensures maximum product flow. These units are used to screen sand or oil to remove tramp materials.

CHOOSE THE PROPER SCREEN MEDIA

Selecting the proper screen media for a given application is the key to delivering screen-sizing accuracy and maximum throughput, which also impacts the performance of upstream and downstream equipment. In its most basic definition, screen media is a surface with openings on a vibrating screen deck that allows undersized particles to pass through and oversized particles to carry over.

Every application is a unique screening challenge, so the type of screen media selected is critical for success. Here are some different types of screen media and their advantages relative to the application:

Woven Wire Cloth is the most common and widely used screening media for jobs like scalping, sizing and dewatering. It is best suited for medium to fine screening and is typically made of carbon steel or stainless steel. While square openings are most common, woven wire cloth can also be designed with slotted openings for more capacity and increased open area.

TYPE OF VIBRATORY SCREENERS



Air-Powered Screeners



Electromechanical Screeners



Gravity Flow Screeners



RSM Series Volumetric Screeners



Portable Sloped Screeners

Choosing the Proper Vibratory Screener

Technical Article

Perforated Plates are a good alternative for secondary screening and are available in various steel types and hardness and are best suited for medium to coarse screening. These plates because of their smooth surface and one-piece construction come in round, square, hexagonal and diamond shapes. The plates are installed flat, bolted in place or mounted with quick clamps for faster change-out.

Polyurethane is a synthetic polymer that is either cast or injection-molded into screen decks or panels/modules. This material is best suited for medium to coarse screening and the screen openings are either square or rectangular (slotted). The life expectancy of polyurethane far exceeds woven wire cloth in wet applications because of its excellent wear resistance and resiliency.

Profile (Wire) Deck made of stainless steel is used mainly for dewatering applications. This type decking consists of V-shaped or triangular wire profiles that are supported in parallel on cross bars. A wide variety of shapes are available. Its primary advantage is above average wear resistance and openings which widen as materials flows through to reduce plug blinding.

Grizzly Bars are used for heavy duty screening applications, such as removing fines from chips and turnings from machining centers. The simplest and most economical are fabricated from round bars supported on spaced cross supports. Advantages are excellent wear resistance, robust construction to handle large materials and configurations that reduce plug blinding.

Wear life for any type of media is largely determined by its mass---the diameter of the wire or the thickness of the plate or the urethane. The media must be heavy enough to handle a given top-size material and peak feed rate. Synthetic screens (rubber or urethane) will wear far longer—often more than 10 times longer—than wire cloth or perforated plate screens.

REDUCING PLUG BLINDING DURING SCREENING

There are many obstacles that reduce efficient screening and one of those root causes is plug blinding. This occurs when material that is being screened contains particles with irregular shapes—similar to candy corn. The point falls into a screen opening and gets stuck or plugs the opening, preventing the fine material from passing through the screen.

Eventually, the screen section can lose its effectiveness as more particles plug into the screen openings. Because the material wedges into the screen opening, the vibration energy used to screen the material is not always sufficient to displace the stuck material, resulting in costly downtime to manually clean the screen deck.

The solution? Install a ball tray deck beneath the screen section. The ball tray has compartments with perforated plate at the bottom. Balls are placed in each compartment and freely bounce during screener operation. The balls strike the underside of the screen surface and randomly knock out the plugged material. The fine material then passes through the screen and the perforated plate at the bottom of the ball tray where it can be collected.

Electromechanical screeners are the ideal choice for making the balls more effective in reducing plug blinding because of their linear action and drive angle. Screeners which use an electric motor to rotate a shaft with counter weights on both ends producing a circle throw motion are also effective.

This article was written by Jack Steinbuch, Equipment Sales Engineer at Cleveland Vibrator Company, Cleveland, OH.

FOR MORE INFORMATION

Call: Sales at 1-800-221-3298

Email: sales@clevelandvibrator.com

Buy Online: www.clevelandvibrator.com

ABOUT THE CLEVELAND VIBRATOR COMPANY

The Cleveland Vibrator Company has been driving innovations in materials handling since 1923. From our corporate headquarters in Cleveland, Ohio, and in partnership with HK Technologies located in Salem, Ohio, we've met the challenges of more than 15,000 customers all around the globe in a vast array of industries. Our comprehensive product line includes air-piston, rotary electric, electromagnetic, turbine and ball vibrators, as well as a wide variety of fabricated feeders, vibratory screeners, ultrasonic screeners, vibratory conveyers and vibratory tables used for light, medium and heavy-duty industrial applications.

