SELECTION OF SCREEN SIZE AND TYPE

Screening is defined as "a mechanical process which accomplishes a division of particles on the basis of size and their acceptance or rejection by a screening surface". Most often the process of screening is accomplished on a vibrating screen.

There are several types of vibrating screens. More details on this subject can be found in Chapter II of this manual.

In the mineral and ore processing plants of today there is need for various stages of screening. The primary or starting point, where material is first delivered to the plant, normally requires large separations. As the material continues on through various stages of reduction, finer separations are needed. There is a vibrating screen specifically designed to handle these various screening applications. The most common screening applications are given in Section 11 of this chapter.

Because of the need to produce material sized to a rigid specification, the vibrating screen has taken on more prominence than ever before in today's material processing plant. The proper type of screen and a sufficient quantity to economically produce the sizes and tonnages needed can mean the success or failure of an operation.

To intelligently select the proper size and type of screen, specific details of every application are necessary. The simplest way of acquiring or providing this information is to complete a screen questionnaire. A copy of the VSMA questionnaire is included in this chapter.

After this information is available, one can begin to review the application and determine the type and size of screen best suited for the duty.

Many materials look alike but will separate somewhat differently. The general characteristics of a material determine its rate of passage through a given hole. Some materials have characteristics that cause them to fracture at a critical size due to their grain structure. If the bulk of the material fractures at a critical size near the dimensions of the screen surface opening, it is difficult to separate. On the other hand, some materials are more friable and have a tendency to break up in quantity to a fine size which makes separation much easier. These are a few of the variables that one encounters in screening. Some others will be covered later.

Although screen size selection is often referred to as an art, a lot of experience has been compiled through research at test facilities and through field data; thus, some very reliable capacity criteria has been developed by the individual vibrating screen manufacturers.

Using the volume of factual data tabulated from the multitude of field test results, a set of statistics—a formula for calculating theoretical screen area—has been developed. While there is some variance among manufacturers, this information is used as the basis of the capacity chart .

The next few pages are devoted to the use of a formula for calculating screening area. The formula presented in this chapter is typical of that used in the industry. ALL CAPACITY FORMULAS ARE INTENDED TO BE USED ONLY AS A GUIDE. Always enlist the knowledge and experience of one of the VSMA members or a reliable screen manufacturer for final recommendations on the type and size of screen best suited for your application.

APPLYING SCREENING AREA FORMULA

A separate calculation is required for each deck of a multiple deck screen, but the same formula is used in each calculation:

$$\text{Screening Area} = \frac{U}{A \times B \times C \times D \times E \times F \times G \times H \times J} = \text{Square Feet}$$

The succession of unknowns that must be established before using the above formula is as follows:

Factor "U"– Undersize	Amount in STPH of material in feed to deck that is smaller than a specified aperture.
Factor "A"– Basic Capacity	Predetermined rate of material STPH through a square foot of a specified opening when feed to deck contains 25% oversize (Factor "B") and 40% halfsize (Factor "C").
Factor "B"– Oversize	Actual % of material in feed to deck that is larger than a specified aperture (Adjusts Factor "A" to suit conditions.)
Factor "C"— Halfsize	Actual % of material in feed to deck that is one-half the size of a specified aperture. (Adjusts Factor "A" to suit conditions).
Factor "D"— Deck Location	Applies for multiple deck screens. Total screening area is available for top deck separation. Time delay for material to pass top deck and 2nd or 3rd decks leaves less effective area available. This factor is expressed in a percent of the top deck effective area.
Factor "E"— Wet Screening	Applies when water is sprayed on the material as it moves down the screening deck. Generally, about 5 to 7 GPM of water are used per STPH of solids fed to the screen. The volume of water required should be supplied so that a portion is combined with the solids into a feed box to prepare a slurry feed to the screen. The balance