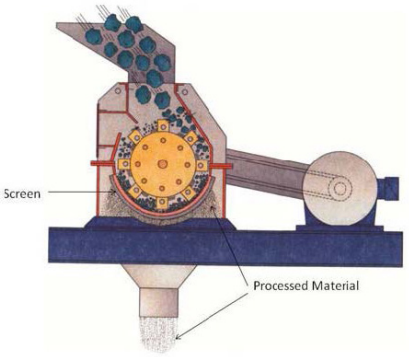
CSE BLISS

The name you know, experience you trust

Intro to Size Reduction

(580) 749-4895 | www.csebliss.com
1415 W. Summit Ave Ponca City, Oklahoma 74602

How is Finished Particle Size Determined?



In any given size reduction application, the specific properties of the material being processed play a key role in how the desired finished particle size is achieved. Hardness, brittleness, moisture content, and other factors are all considered when selecting not only the appropriate style and size of the equipment, but also in the configuration of the mill's internal components.

Three Key Factors

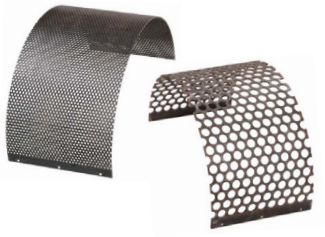
1. The screen, or bar grate, provides up to 70% control over the finished particle size in the majority of hammer mill applications. Once material enters the grinding chamber it must be reduced to a size small enough to pass the screen or bar grate openings before it can exit the mill.
2. Rotor Speed. The faster the rotor speed, the more severe and greater the number of times the hammers will impact the material, producing a finer finished particle size. Conversely, a slower rotor speed equates to fewer hammer impacts, and a coarser end product with fewer fines generated.
3. Hammer size and number. Large, and/or heavy hammers impact the material with greater force, resulting in a finer end product.

In Short:

Fast rotor sped + small screen + large and/or large number of hammers → Fine finished particle size

Slow rotor speed + large screen + small and/or fewer of hammers → Course finished particle size

Screens



Screens and bar grates are constructed from steel, and are available with perforations (screens) or spaces (bar grates) in a broad range of sizes.

Screen size is determined by the size of the perforations, and is described in the following terms: inches, millimeters, microns (one millionth of a meter), and US mesh (the number of wires running east/west and north/south in one square inch of screen).

Using the same 1 inch screen, various materials result in finished particle sizes:

Glass	Green Wood Chips	Computer Hard Drives
Very Fine	½" nominal	¼ - 1" nominal

Particle Size Distribution

Appropriate screen size is determined by the desired finished particle size, and the properties of the material being processed. Characteristics such as friability and moisture content have an effect on how easily a material is reduced. As a result, using the same screen to process materials of different properties will result in a range of different particle sizes.

- Glass is very friable, and will shatter easily upon impact.
- Green wood chips are fibrous, with a moisture content up to 50%, both effecting the ease at which they are reduced.
- Computer hard drives are very hard, comprised mostly of metals. As a result, they are reduced to a size just slightly smaller than the screen size installed.