



What to know before buying a **HAMMERMILL**

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What you need to know before buying:

HAMMERMILL

1. Introduction

Size reduction is a unit operation where the average size of solid pieces of food is reduced by the application of forces. This unit operation is widely used in several industries and includes different operations such as milling, crushing, grinding, mincing and dicing. Milling is usually done to improve the product's edible quality or to make it more suitable for further processing. For cassava value addition, the dried grits are milled into flour with a hammermill. It is an energy-intensive operation and therefore choosing the correct equipment is paramount.

2. Hammermills

Hammermills are one of the most commonly used piece of equipment for food size reduction. They are composed of *hopper*, *housing*, *rotor*, *rods*, *hammers*, *sieve*, *blower* and *cyclone*. The *hopper* feeds the product into the *housing*. Inside the housing the *rotor* and the *rods* spin at high speeds. At their periphery, the *hammers* are attached and swing in a circular path. The hammers hit the product entering the housing, reducing its size by impact. The product leaves the housing when is small enough to pass through the *sieve* at the bottom. The sieve is replaceable and available with different apertures. However, the particle size is not controlled by the sieve apertures alone; there is a complex interrelationship between aperture size, shape, rotor speed, sieve thickness and total open surface area of the sieve. The *blower* generates the forced air needed to convey the product, and the *cyclone*, in the end, separates the milled material from the conveying air.

3. Energy performance indices

Hammermills can be powered by electric motors or internal combustion engines. The amount of energy used depends on the initial particle size of the product being fed, its moisture content and the final particle size (e.g., the finer the size reduction, the higher the energy requirement). Therefore, while comparing performance indices of different equipment, it is important to ensure that measurements are made with similar products at similar initial and final conditions. The main performance indices are *grindability* and *specific energy consumption*. *Grindability* is defined as the mass rate of a product at a certain specification (e.g., a kilogram of product passing through a sieve of a certain mesh size per hour). *Specific energy consumption* is the amount of energy needed to reduce 1 kilogram of product into a certain particle size. Benchmarks and ranges for those energy performance indices have not yet been determined.

4. Quality and safety

There are many manufacturers of hammermills and their basic designs are very similar. However, small variances in building materials can lead to large differences in maintenance costs. Most importantly, the hammers should be made of manganese steel or any other hard-wearing food-safe material. In addition, all parts that come into direct contact with the cassava dried grits should be built with a material that does not exchange components with the food, does not react with detergents, and can be easily cleaned. Further, all belt drive components should be enclosed under a safety guard. Finally, during equipment operation, a dust mask should be worn.

5. Summary: check before buying

- Are the equipment's *grindability* and *specific energy consumption* suitable to the process centre operation?
- Are the hammers made of hard-wearing material (e.g. manganese-steel)?
- Are all the parts that come into direct contact with the cassava made of food-safe material?
- Are all the belt drive components enclosed under a safety guard?