



## Grinding out the right solution

Size reduction is one of the oldest processes known to man from before time when grains were pounded and ground to make flour. Size reduction machines still mill harvested materials but also a vast variety of other food, chemical, pharmaceutical, and mined materials too. Every industry has its own requirements and every product presents its own challenges; this is where the expertise within the SHAPA membership have the solutions to all your size reduction requirements.

Most processes requiring size reduction are carried out using a mechanical process. For example, to grind minerals, the mined products are tumbled amidst heavy balls or long heavy rods which have a crushing action – hence the existence of Ball Mills and Rod Mills. Hammer Mills, literally metal hammers whirled round at high speed, are another method of pulverising minerals or metallic compounds.

The fine grinding of Food, Chemicals and some Pharmaceuticals usually takes place within Pin and Disc or Turbine Mills. These mills can reduce materials down to the fineness of flour or icing sugar and are the general workhorse of the Food, Chemicals and some Pharmaceuticals industries. Sieves, sifters and classifiers are often used in conjunction with these types of mill to screen out any oversize material so that it can be discarded or returned to the mill for further processing.

For the finest grinding of materials down to sub-micron sizes, Jet Milling is the more appropriate process. In a Jet Mill, material is circulated around a circular or oval chamber at very high velocity under the influence of a compressed gas or steam. Size reduction is achieved purely through the attrition of one particle against another or the impact of particles against the wall of the milling chamber. The outlet of Jet Mills can be adjusted so that material can only exit once it has been reduced to the required size. Otherwise, it remains in the mill until it has!

Some materials though require special treatment. For example, volatile oils which give spices their desirable potency can be driven off through the temperature increase that occurs during any grinding and milling process. To combat this, cooling of the mill and hence the product itself is essential, normally this is carried out by using a cooled airflow through the mill. Where the product can be potentially explosive ATEX considerations need to be considered and, in these circumstances,, cooling can be carried out using inert gases. Cooling down to cryogenic temperatures using liquid nitrogen even makes the grinding of rubber, possible. In addition, the use of a nitrogen blanket can prevent the deterioration of aromatic products through oxidation during milling.

Size reduction is a key process in many production lines. Ensuring you have the optimum equipment for your materials is a job for the experts and you'll find none better than those among the SHAPA membership

The complete range of grinding and milling equipment is available from within the SHAPA community. To inspire real confidence at an economic cost throughout the lifetime of your process, check out the Equipment Finder at <https://www.shapa.co.uk/equipment.php> or alternatively, you can email your enquiry to direct to SHAPA at [info@shapa.co.uk](mailto:info@shapa.co.uk)