

What a size reduction machine requires for reliable, economical performance

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Read this article to get a running start in choosing a size reduction machine for your application. The information explains what features the machine requires to provide reliable, cost-effective operation over the long term.

Whether your material requires coarse or fine grinding, the size reduction machine you choose must meet several basic requirements to ensure that it can perform reliably and economically for years to come. These include:

- The machine's grinding tools, machine housing, and drive assembly should have simple, rugged designs to withstand wear from abrasive materials. For instance, for highly abrasive applications, housings and grinding tools such as knives and hammers can be constructed of heavy-duty or special alloy steels.
- The machine should have an operator-friendly design with easy access to the grinding chamber to simplify cleaning and wear parts replacement. For instance, a knife mill with a split housing that can be manually or hydraulically raised and lowered allows easy access to the rotor, knives, and screen.

- The machine should operate reliably to provide efficient 24/7 production and stable operation despite feedrate fluctuations — especially overloading — while providing consistent processing and product quality. For instance, to prevent an overload from increasing the temperature in the machine and potentially damaging your material, the machine should have a safety mechanism that detects an overload and then gradually decreases the feedrate or even brings the machine to a halt.
- The machine should easily handle your material and be easy to monitor so that it doesn't require continuous supervision. For instance, if your material is sticky or has other char-



This knife mill has an operator-friendly design that provides easy access to the grinding chamber to simplify cleaning and wear parts replacement.

acteristics that prevent it from flowing freely, the machine may require a liner, a specially designed inlet and discharge, and other features to ensure that the material flows freely inside the machine and from the discharge after grinding. Choosing a size reduction machine equipped with a control system that monitors the machine temperature, amp load on the motor, and the material feedrate will reduce the amount of operator supervision the machine requires. Locating the control system's control panel in your process control room or another central location will also make the machine easy to monitor.

- The machine should have adjustable machine settings or interchangeable grinding tools, or both, so you can adapt the machine to handle various size reduction requirements.
- The machine should consume low specific energy (energy per unit mass, such as Joules per kilogram) to ensure that it can operate economically over the long term.
- The machine's grinding chamber should be designed to prevent material buildup. For instance, if your material is moist or greasy, it can build up inside the grinding chamber and on the grinding tools unless these components are designed with smooth finishes that promote material release.

- The machine's design should comply with the appropriate FDA, good manufacturing practices, and clean-in-place requirements for your application.
- To provide maximum flexibility for handling your future size reduction needs, the machine should be easy to adapt to cryogenic applications and applications that produce combustible dusts. **PBE**

For further reading

Find more information on selecting size reduction equipment in articles listed under "Size reduction" in *Powder and Bulk Engineering's* comprehensive article index at www.powderbulk.com and in the December 2006 issue. Also look for the author's detailed article on choosing size reduction equipment in the June 2008 issue.

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Do you have a tip that saves time or money or improves processing efficiency or equipment operation? Send it to Editor Terry O'Neill, Powder and Bulk Engineering, 1155 Northland Drive, St. Paul, MN 55120, fax 651-287-5650 (toneill@cscpub.com).