

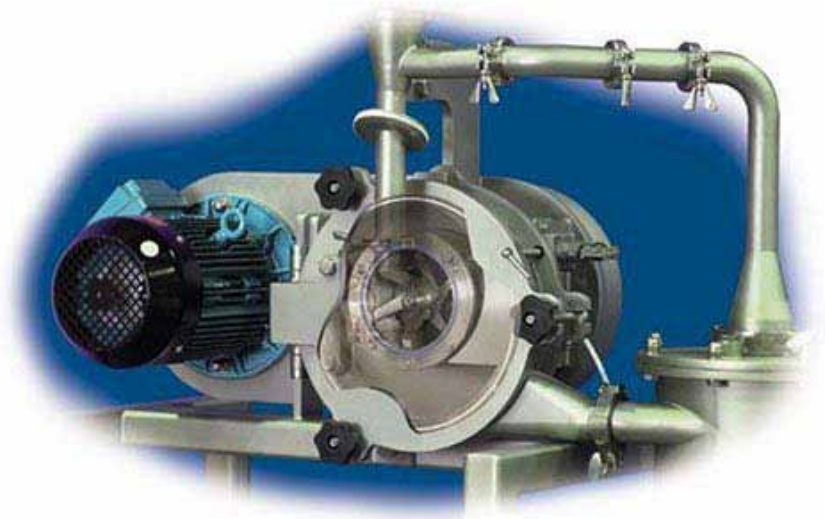


# POWDER PROCESSING SYSTEMS FOR TEMPERATURE CONTROLLED GRINDING

Soft, waxy or ductile materials are often difficult to grind at normal temperatures. Production rates are low and particle size may not be sufficiently fine. Product flow might also be poor. Such materials will usually build up in the mill and cause blockages.

Kemutec are among the pioneers in low temperature size reduction systems. Processing temperature is kept low enough to prevent softening or degradation of the feedstock. The most powerful and flexible refrigerant for this task is liquid nitrogen, which ensures efficient refrigeration and rapid heat transfer.

The design of 'refrigerated' milling systems depends on the heat sensitivity of the material under consideration. There are two basic types of systems, temperature-controlled grinding and cryogenic grinding.



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### Temperature Controlled Grinding

Many materials, which are brittle at room temperature, may not be so at the higher temperature generated during the size reduction process. These materials will be difficult to grind, with poor production rates and frequent mill blockages. This can be more prevalent during warmer atmospheric conditions.

Low product exit temperatures, of between 0° C and +30°C, can be maintained by injecting liquid nitrogen into the mill air stream. The design of Kemutec systems incorporates liquid nitrogen metering which gives fine control over its use; accordingly the cost of the liquid nitrogen is far outweighed by the increased grinding rate and consistent trouble-free grinding.

### Cool Grinding

A similar arrangement can also be used with nitrogen, argon or other inert gasses to prevent explosions during milling of reactive products, or to prevent deterioration of those products, which oxidize rapidly.

### Cryogenic Grinding

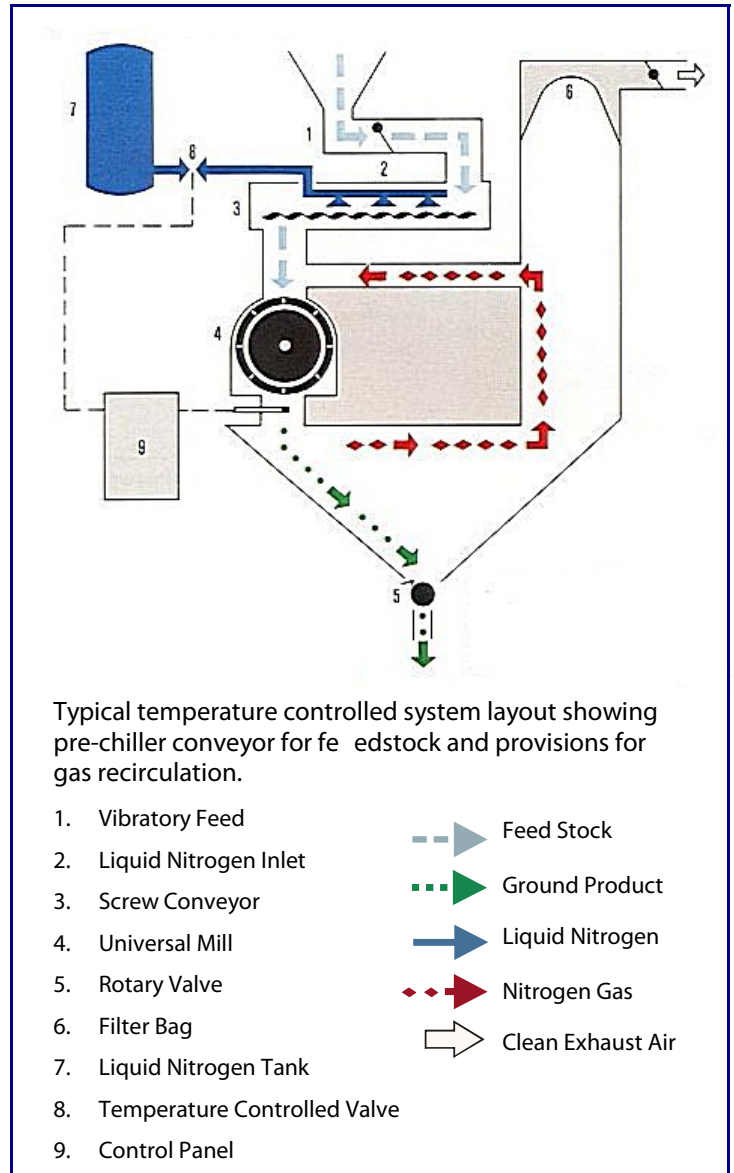
Many materials are impossible to grind even at room temperature. By cooling and embrittling them at temperatures down to minus 100°C and lower with liquid nitrogen, it is possible to grind problem materials finely. The use of liquid nitrogen usually results in a cubic particle with good product flow characteristics.

In addition, cryogenic systems are ideal for aromatic food products, such as spices. At very low temperatures, far less volatile oils are lost, preserving the quality of the product.

Black pepper, for example, typically loses around 36% of volatile oils during conventional grinding. By cooling to minus 20°C and maintaining the milling chamber at that temperature, the loss is reduced to 7%, and throughputs can be increased by between 50% and 100%.

Atomized liquid nitrogen is sprayed directly into the feedstock as it is metered into the mill by a screw conveyor, which ensures even cooling. The cold nitrogen gas, evolved on contact with the feedstock, is then used to cool the mill air stream. A mill gas recycling system ensures that the maximum possible refrigerant value is extracted from the nitrogen.

If further cooling is required, liquid nitrogen can be injected directly into the mill air stream.



Kemutec supplies Kek brand Sifters and Mills, PPS Air Classifier Mills, Gardner Mixers and Blenders and Mucon Valves and Discharge Aids.

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