- Mayer rides again
- 25-page feature on conveyors, belt scrapers & ancillaries
- Choosing dust suppression products
- Container tipplers and transhipment
- Stackers, reclaimers, shiploaders
  - New players threaten supply oligopoly
  - AS 4324.1 due for revision
- Bulk solids bulk density determination

Mobile Bulk Material Handling
US manufacturer Morre-Tec, which makes food, pharmaceutical and chemical products, employs a Kason screener to produce a powdered additive for nutritional products. The centrifugal sifter manages to remove flakes from two to five micron crystalline particles.

Morre-Tec uses a patented process called micronizing, for reducing solid particles to uniform micron size, without damaging their crystalline structure.

The micronising process is currently used to produce a proprietary product called Microphyte plant extract. Morre-Tec employs a soft milling process that incorporates a Kason screener to remove oversize particles.

Microphyte is a solid phytosterol that is insoluble in water but, once reduced to an average three micron size, will form a stable emulsion that will not settle out. When added to liquid nutritional products, it acts to lower cholesterol levels in the blood.

A key step in the proprietary process is soft milling of the initial plant extract, which reduces incoming particles averaging 40 microns in diameter to particles averaging 2-5 microns.

However, particles agglomerating into flakes on the walls of the vortex mill, and further compacting in the product collector were balling up and sitting on top of the original circular vibratory screener.

Morre-Tec said that to solve this problem, the company installed a Kason Centri-Sifter centrifugal screener that removes the oversize particles.

The plant extract is delivered to Morre-Tec's facility in 907kg bulk bags, which are gravity discharged into a horizontal feeder equipped with a dust collector to prevent valuable product from escaping into the atmosphere.

The material is then fed by compressed air through a special airlock into the micronisation chamber. The patented micronisation technology, licensed from Super Fine of Israel, is known as Vortex Milling.

Morre-Tec's president, Leonard Glass, said "Unlike jet milling, which relies on collision and abrasion to reduce particle size, the process creates rapid serial changes within a vortex chamber to replicate tornado-like conditions that cause the particles to fracture along their weakest fissure lines.

"Since the particles never actually touch each other, they are reduced to their optimum size without being exposed to destructive forces that can affect crystal morphology."

The process is effective because every particle has inherent structural weak points, Glass explained.

"When exposed to the proper aerodynamic conditions, the particle will fracture at its weakest point. The air pressure within the vortex chamber oscillates from extremely high to extremely low within a matter of micro-seconds."

"This creates a pressure differential inside and outside the particle that causes it to crack. The process continues until each particle reaches its strongest crystalline structure."

Because the process relies on pressure differential rather than abrasion, the hardness of the material has no significant effect on its ability to fracture, according to Glass.

"Materials that soften with heat can be micronised without external cooling since no exothermic heat is generated by friction. In fact, the process is slightly
endothermic and works well for materials that are sensitive to heat and would otherwise require cryogenic cooling.

"Materials that contain water of hydration within their crystalline structure can be milled with no detrimental drying effect, while the process yields an extremely narrow particle size distribution."

Once the particles have been micronised, they are transported by compressed air up a pneumatic line into a product collector from which they are metered through a rotary airlock into the inlet spout of the centrifugal sifter.

A feed screw directs them into the cylindrical sifting chamber, where rotating, helical paddles that never make actual contact with the 25 mesh (707 micron) stainless steel screen, continuously propel them against and through apertures in the screen.

On-size micronised powder discharge from the centrifugal sifter. Kason says Quick-Clean design allows easy removal of internal components for cleaning between production runs. Portable stand permits moving the sifter to other production lines.

The oversize agglomerated flakes and hard particles are propelled through the open end of the cylindrical screening chamber and a discharge spout, to be recycled in the vortex mill, leaving only particles five microns or smaller that can be easily dispersed in liquid.

Morre-Tec’s vice president operations, Paul P. Caskey, said "The centrifugal sifter is mounted on a stand with wheels for easy transfer to other production lines. It meets all applicable standards, and removeable end housings with rubber gaskets permit cleaning in just a matter of minutes.

External roller bearings are located at the motor end of the shaft and on a hinged cover at the discharge end for maximum support and vibration-free operation.

When the end cover is hinged open, the shaft becomes a caisson supported by a third externally mounted roller bearing located between the motor end bearing and the material feed point, allowing internal components to slide freely from the opposite shaft end.

"The sturdy three bearing design, and switching from nylon to stronger stainless steel screen baskets, eliminated the screen breakage problem," Caskey said.

The sifter also eliminated a problem that Morre-Tec’s customer was experiencing with agglomerated particles clogging their equipment, Caskey said.

"Since we installed the centrifugal sifter, we have had zero complaints. Because screen changes can be accomplished in less than two minutes and cleaning is quick and easy, we can use the sifter for other branded micronised products such as our Dicalcium and Tricalcium Phosphates and our Creatine Monohydrate.

"We can also offer toll micronising of non-hazardous ingredients for food, cosmetic, nutritional and pharmaceutical applications."

Kason’s Australian distributor is DTD Engineering.

Contact: www.dtdeng.com.au

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