SOLIDS & BULK HANDLING

Storage, Control, Movement and Processing of Loose Materials

Good foundations

Pin mill helps cosmetics producer meet quality standards

With seven manufacturing and distribution facilities, totaling more than 232,225 sq m, Cosmetic Essence, New Jersey, claims to be the leading global provider of services to the personal care industry. While the bulk of its business is contract production and packaging of products for the world's brand name cosmetics companies, CEI also does research and development of new products for its clients.

In 2007 the CEI Roanoke facility received an unusual request from a client: To help produce a proprietary line of the client's minerals-based face powders using a pin mill, also known as a centrifugal impact mill, to obtain the desired particle size.

CEI, like many cosmetics contract manufacturers, was not familiar with pin mills, says David Wardach, vice president manufacturing for CEI Roanoke. "Mostly we use hammer mills and jet mills, but in this case the client uses a pin mill in its own operation and we had to duplicate the client's process. As we have learned from experience, the pin mill is ideal for mineral-based face powders."

To learn about pin mills Wardach did an Internet search, which led him to Munson Machinery, New York. "Munson's Steve Knauth and Jerry Spross of EPI technical sales, were helpful in analysing the process and providing the appropriate machine for our needs," says Wardach. "They loaned us a machine for testing and the tests were successful, so we bought one."

Two pin mills process multiple products

That machine was installed in July 2007 and was initially used for one product in the line of face powders. Other products have been added since then and today CEI produces five different formulations, each one in six colour shades. A second pin mill was added in July 2008 to handle the increasing load.

CEI produces the face powders to order in batches of 100–400 kg. The principal ingredients — titanium dioxide and iron oxides — are weighed and fed to a twin-shell intensifier blender that has a capacity of 400 kg.

ABOVE: An operator adjusts the inlet to the pin mill

Iron oxide (foreground) and titanium dioxide are basic raw materials for CEI's face powders

From the blender, the mixed product is dumped into a hopper, then fed by a proprietary means to the pin mills, which reduce particles to a fine powder. Each mill is made of stainless steel and consists of two 46 cm diameter parallel disks, each of which has five concentric rows of pins on its face. The two faces are set close to each other, so that the pins on each disk intermesh.

In operation, one disk remains stationary while the other rotates at speeds ranging from several hundred to 5,400 rpm, powered by a 15 kW motor. Process material is fed through the top-center of the stationary disk and is thrown to the periphery of the disks by centrifugal force. Along the way, the particles are reduced in size by the dynamic force created between the rotating and stationary pins, the final particle size being determined by the rotation speed.

CEI's two pin mills, which are identical, are located in series, since it takes two passes to achieve the desired particle size. Initially, when the company had only one mill, the product had to be recycled through the machine. CEI operates both machines at 3,600 rpm.

A fast-flowing stream

Product exits each mill through a port in the bottom of the machine, entrained in an 8.5 cu m/min air stream that is generated by the speed of the mill. The air stream not only provides high throughput, but also cools the mineral-based powder, thereby protecting it from possible degradation by frictional heat generated within the mill.

Handling the large volume of air was a challenge at first, says Wardach. CEI solved the problem by means of a rotary valve that separates the product from the air, which is vented. After leaving the second mill the powder is collected and transferred to the hopper of a filling machine that fills the product into jars.

Wardach adds that the machines "have worked well and quality has been great. The operation has run smoothly and the repeatability has been very good."

For more information contact Munson Machinery by email: info@munsonmachinery.com or visit: www.munsonmachinery.com