Jet mills propel a custom processor's fast takeoff

A start-up custom processor selects jet-milling equipment based on its reliability, efficiency, and cost.

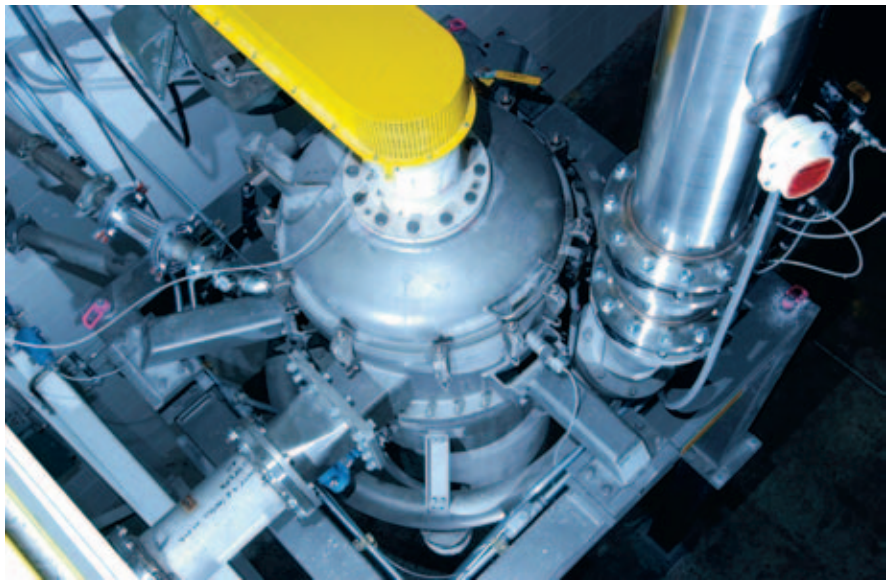
We started the company knowing that there was a market for custom and toll processing dry bulk solids," says Gregg Shemanski, president of Custom Processing Services Inc., Reading, Pa. "And based on past experience in this field, I knew that we'd succeed if we initially focused on services using jet-milling equipment."

Consequently, after incorporating in October 1998, Shemanski's first big step was researching and testing jet-milling equipment. The mills would have to be able to process chemicals, waxes, minerals, metals, functional fillers, pigments, and various other dry materials. Shemanski also wanted to be sure the equipment would be reliable, efficient, and cost-effective. So he evaluated jet-milling equipment from four different suppliers and tested each mill using the same material and particle size analyzer.

"I test-ground the material at each supplier's facility to the same particle size and collected data about each jet mill's power consumption, air consumption, ease of use, throughput rates, particle size distribution, final product quality, and price," says Shemanski. "After comparing the results, I found that all of the jet mills successfully reduced the material and produced similar particle size distribution curves. However, one supplier's mill used ten percent less energy than the others to reduce the same material amount, which would save us money in the long run."

Shemanski contacted the jet mill's supplier, NETZSCH Fine Particle Technology, Exton, Pa., to purchase a similar mill for his company. The supplier provides grinding and dispersion equipment and particle size reduction systems. After talking with the supplier and learning more about its other jet-milling equipment, Shemanski also purchased a jet mill with a urethane-lined grinding chamber and ceramic-lined contact parts for reducing abrasive and ceramic materials.

The first jet mill Shemanski purchased had twice the airflow capacity as jet mills used by other custom processors at the time, while the jet mill for reducing abrasives and ce-



The CGS 71 fluidized-bed jet mill with stainless steel contact parts provides ultrafine grinding and tight particle-size control for reducing materials with sanitary requirements.

ramics was similar in size to what other custom processors were using. "I chose to buy the larger jet mill first because it could handle our initial base loads and easily accommodate future growth," says Shemanski. "I decided to purchase the other jet mill after I spoke with some of the supplier's customers who were grinding tungsten carbide in similar mills. I was very impressed with the mill's durability and how little money they spent replacing material-contact parts."

The company begins operations

In January 2000, the company placed its order for the two jet mills. In midsummer, the company moved into its newly built facility and began installing the jet-milling equipment. By the end of October 2000, the company was calibrating and fine-tuning the jet-milling equipment, preparing it for the first production runs.

"We connected each jet mill to its own PLC, which controls and monitors the mill and its feeders, valves, blowers, safety systems, and other components," says Shemanski. "The PLC optimizes the jet mill's operation because we can set each component's operating parameter to establish the best milling condition to properly process a material to a customer's required specifications."

In December 2000, Custom Processing Services began processing size reduction orders with the new jet-milling equipment. The two jet mills performed so well that after 1 year of using them, Shemanski was

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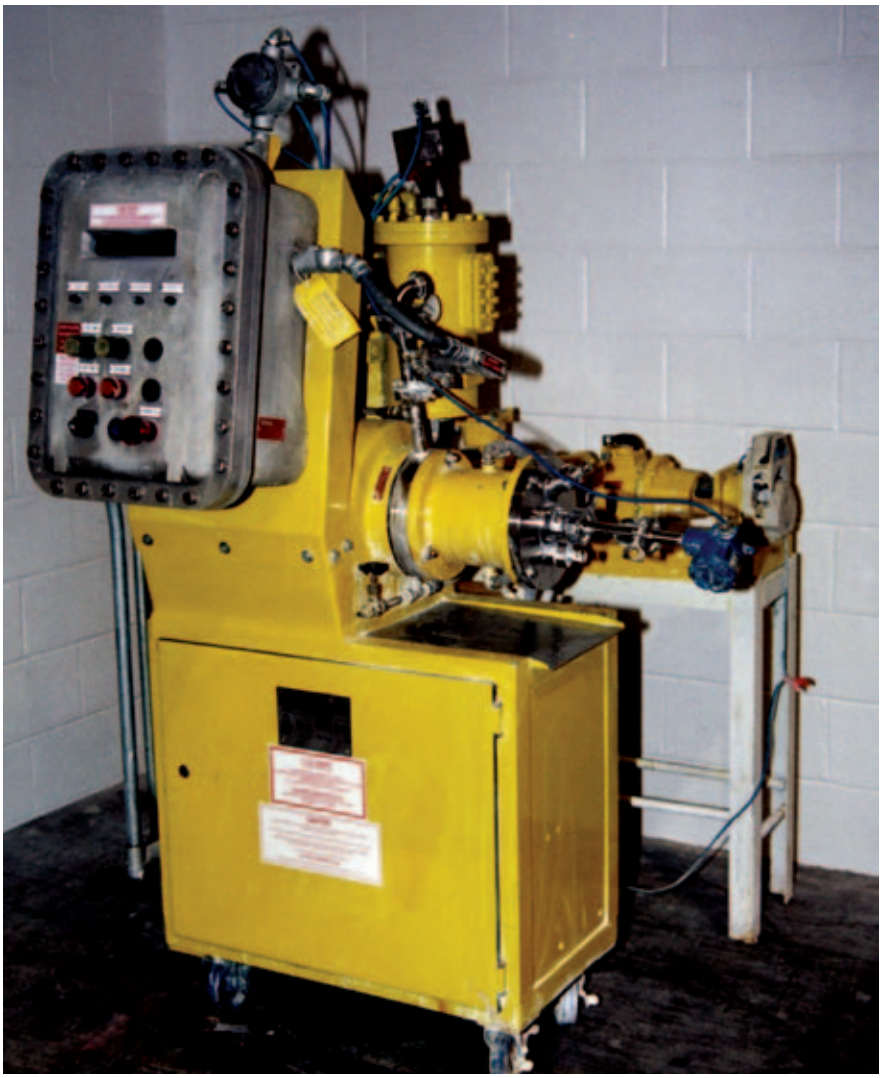

The LMZ ZETA II horizontal bead mill for wet grinding reduces materials down to between 40 and 200 nanometers.

able to reduce the company's maintenance budget by 75 percent, because the actual cost to maintain the mills was just a fraction of what he had originally budgeted.

"The supplier's equipment is very durable and doesn't require a lot of maintenance," says Shemanski. "And because the equipment performance was excellent, maintenance costs were low, equipment upkeep was easy, and the supplier provided technical support, we decided to go back to the supplier and purchase two additional jet mills, one universal mill, and one wet-grinding mill."

The size reduction equipment

The original mill the company purchased was the CGS 100 fluidized-bed jet mill, which provides ultrafine grinding, tight particle-size control, and easy cleaning and maintenance. This mill uses high-pressure air to reduce hard, abrasive, and temperature-sensitive materials down to between 2 and 70 microns and is ideally suited for applications that require very fine particles and a steep particle size distribution.

The second mill was the CGS 71 fluidized-bed jet mill with a urethane-lined grinding chamber and ceramic-lined contact parts for metal-contaminant-free size reduction applications. Though smaller in size, the mill operates the same way as the CGS 100 jet mill. This mill allows the company to reduce abrasive, ceramic, and other hard materials without abrading metal contact parts, resulting in a finished product with absolutely no metal contaminants.

After the first two mills proved successful, the company purchased another CGS 100 fluidized-bed jet mill and CGS 71 fluidized-bed jet mill with stainless steel contact parts for sanitary applications, as well as one CONDUX universal mill 300 and one LMZ ZETA II horizontal bead mill for wet grinding.

The all stainless steel universal mill grinds materials down to between 44 and 500 microns and can be set up as a pin mill, counter-rotating pin mill, or blast-rotor mill, which provides flexibility for grinding a wide range of materials. The horizontal bead mill's high-energy, high-flow, multiple-pass grinding achieves very narrow submicron particle size distributions with repeatability. This mill uses 100- to 500-micron grinding media and can reduce materials down to between 40 and 200 nanometers.

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Recently, the company installed its latest purchase from the supplier, a CONDUX classifier mill CSM 360 with stainless steel contact parts for sanitary applications. This mill's high-volume airflow allows temperature-sensitive materials to be reduced to between 8 and 80 microns. The mill can easily reduce materials with a Mohs' hardness up to 3.5 and deagglomerate materials with a Mohs' hardness up to 5.

The strategic alliance

The company operates 24 hours a day, 7 days a week, providing custom and toll size reduction, crushing, blending, coating, surface treating, and packaging services. The company can process any material amount, from a few kilograms up to truckloads per week, and specializes in dry powders for the pharmaceutical and chemical industries.

Shortly after starting operations, the company and the jet-mill supplier formed a strategic alliance based on customer referrals and sharing information. "For example, if we're unfamiliar with a material's grindability, we can use the supplier's test center to find the best way and the best equipment to use to reduce the material," says Shemanski. "The supplier's test center contains lab-sized size reduction equipment that's scalable to the equipment we use. So after a test, we just have to scale things up for a large production run in our facility."

PBE

The company uses the CGS 100 fluidized-bed jet mill to reduce hard, abrasive, and temperature-sensitive materials down to between 2 and 70 microns.

Note: To find other articles on this topic, go to www.powderbulk.com, click on "Article Index," and look under the subject heading "Size reduction," or see *Powder and Bulk Engineering*'s comprehensive "Index to Articles" in the December 2004 issue.

NETZSCH Fine Particle Technology, Exton, PA

610-363-8010

www.netzschusa.com