A Cut Above

“We make this pharmaceutical product that ends up being big bricks of tough, brittle material,” says the blending team leader of a growing pharmaceutical products company, “and we couldn't reduce it to the size it needed to be. I can't even begin to tell you how frustrating it was.”

The team leader is discussing the problem his company had with one of its key products, a bulk sweetener used in many food products and in pharmaceutical products such as lozenges and suckers used to palatably feed medicines to sick children. In the company's case, pharmacists buy the product; melt it; add food coloring, flavoring, and an active ingredient (such as a stomach-calming or pain-relief agent); and put it into molds to create medicated lozenges or suckers.

The problem

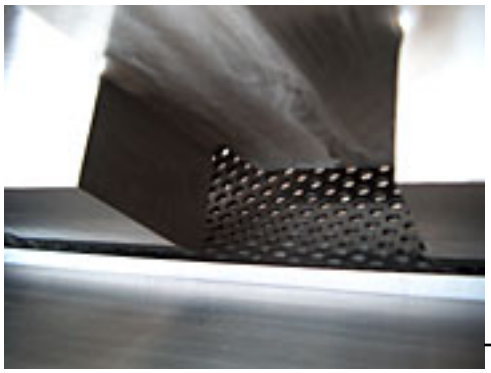
To make it easier for the pharmacist to handle, the bulk sweetener needed to be in small pieces — ¼ inch in diameter or even smaller. But the company formed the product in 3-by-6-by-9-inch bricks weighing 5 to 7 pounds each. The material was similar in character to Jolly Rancher hard candy — brittle but tough and, if it gets hot or wet, sticky. The company was having a difficult time finding a way to reduce it to the right size.

“We tried stainless steel hammers, but they didn't work. We tried producing it in molds about the size of ice cubes, but that didn't work either,” says the team leader. “We still couldn't get it down to ¼-inch pieces. We bought an ice-shaving machine, but the material completely destroyed that. Then we tried a restaurant cheese-grating machine, but the machine generated heat that made the material melt all over it. We were at our wit's end.”

The company looked for outside help and found several custom processors that said, “Sure, we can crush this product for you — no problem.” But after trying it, all of them came back to the company and said, “Sorry, we can't help you with this.”

“We actually had some of our product just totally stop a machine. It gummed it up so bad they had to break the machine down. It totally wiped it out,” says the team leader. “We were really in a dilemma. We had this product but no way to get it to the customers the way they needed it. It was an extreme headache for us.”

Search for a solution



Then in February 2002, company members attended a trade show in Anaheim, Calif. On their last day at the show, they walked into the equipment supplier area, and the first booth they saw belonged to Munson Machinery, Utica, NY. The team leader explained the problem to one of the supplier's reps, who said, “I think we have the machine for you.” The pharmaceutical products company had heard that before, but after talking with the supplier's people the company members went home with a touch of hope.

The following Monday, Steve Knauth, regional sales manager at Munson, called the company to talk about the problem in more detail. By week's end, the company had sent several bricks of the bulk sweetener to the equipment supplier's test center in Utica. The supplier was pretty sure its SCC rotary cutter was the way to go and tested the material in the model SCC-15, which has a 15-inch-long rotor. The supplier also tested it in a heavy-duty cutter and a hammer mill. However, because of the material's characteristics, the desired final particle size, and the rotary cutter's ability to crush as well as cut, the rotary cutter did turn out to be the best machine for the job. The company recommended the larger model SCC-30, which has a 30-inch rotor.

The pharmaceutical products company was unable to send representatives to Utica for the tests, so the equipment supplier sent the processed samples and a videotape of the tests back to the company. When the team leader saw the samples, he was thrilled. They were exactly what the company wanted. But company managers were still leery. Purchasing the machine would represent a significant investment, and they'd been disappointed before.

Then they viewed the videotape. “That made the sale,” says the team leader. The tape showed the tests from beginning to end. The company managers saw their tough, brittle bricks go into the cutter and come out as tiny pieces ¼ inch and smaller.

With the first hurdle cleared, the two companies discussed the custom engineering that would have to be done to meet the pharmaceutical company's needs: The machine would have to be engineered to meet sanitary requirements. “The equipment supplier was really fabulous to work with,” says the team leader. “The communication was great.”

After the details were worked out, the company placed its order and received the custom-engineered model SCC-30 sanitary cutter-crusher about 2 months later.

The rotary cutter

The standard SCC rotary cutter consists of a vertical or horizontal gravity-infeed hopper; a heavy-duty welded and bolted reinforced plate steel cutter housing with stationary bed knives on the front and back walls; a rotor fitted with a series of interconnected parallelogram-shaped cutters, each incorporating two replaceable cutter inserts with tungsten carbide tips; a classifying screen in the cutter housing's bottom; a gravity or pneumatic discharge; and an enclosed drive arrangement.

In operation, the material is fed into the infeed hopper, where it falls by gravity into the cutter housing. As the rotor revolves, the material is reduced by the cutter tips, which cut against the stationary bed knives. The cut material drops onto the classifying screen, and on-size material drops through the screen to the discharge. The machine's rotor creates a high airflow volume that fluidizes the material: Oversize material doesn't merely sit on the classifying screen; the air vortex keeps it moving, allowing the rotor to cut it on the rotor's upswing as well as its downswing.

The equipment suppliers' engineers worked closely with the pharmaceutical products company to custom-engineer the machine to meet sanitary requirements. The result was a sanitary cutter-crusher constructed of stainless steel with continuous welds ground and polished to FDA standards. The most challenging engineering task was to make the rotor comply with the sanitary requirements. “We had to make the parallelogram-shaped cutters much larger than the standard ones so that our welders could get in there and make continuous welds and then grind and polish those welds,” says Knauth.

Another change is that the sanitary parallelogram cutters have no replaceable cutting tips as the cutters on the standard machines have. But the pharmaceutical products company doesn't have to worry about replacing the cutters. “They're all

stainless steel, and they'll outlast my life,” says Knauth.

The machine also had to be easy to thoroughly clean, and this one is. "It's gorgeous," says the team leader. “The bearings are self-cleaning, and the machine is easy to clean. We just remove the top, the two bed knives, and the classifying screen, and that's it. We hose it down with hot water, scrub it with soap and water, and then do a citric acid wash. We put it back together and it's ready to go.”

The custom-engineered sanitary cutter-crusher was shipped to the pharmaceutical products company and was ready to operate right out of the box. The machine is mobile, so the company installed floor bolts and configured the electrical supply to handle the machine's 20 horsepower, 230/460 1,800-rpm motor-drive arrangement. With that, installation was complete.

Results

Now when the company has to reduce a batch of the difficult material, an operator manually feeds the sweetener bricks into the infeed hopper. They flow by gravity into the cutter-crusher housing. The bricks are cut, crushed, and discharged as ¼-inch and smaller pieces into a plastic pail or tub.

Once in the cutter housing, “the bricks are pounded,” says Knauth. "The machine is as much a pulverizer as it is a cutter. That's one reason it works so well with this stuff."

The company presently reduces bulk sweetener bricks about 2 days a week. The rest of the time the machine is out of the way in a storage area. “We bought such a heavy-duty machine,” says the team leader, “because our customer base is growing. We expect this machine to do what we need for a very long time.”

The company is pleased with its purchase. “This is the best piece of machinery we own, by far,” says the team leader. “We suffered so much frustration before — this machine just blew us away.”

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