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Environment

Market and
Management

1

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Volume 12

 VOGEL



Control Cabinet Systems

Fast track retrofit

22

Catalysis

New solutions in the pipeline

16

Pharmaceutical Technology

Plant engineering under pressure

30

Pumps

Innovative pumping for glycol

40



Achim Noack,
Managing Director at
Bayer Technology Ser-
vices: "2009 will certainly
not be an easy year, but
we believe that emerging
markets such as China
and India will continue to
expand, and we want to
benefit from those market
dynamics."

Page 8

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This rotary batch mixer is one of three 1.42 m³-capacity Munson mixers used by Bonide Products.



Pictures: Munson Machinery

Simple yet versatile

How Munson Machinery helped a manufacturer with a wide product range

When US manufacturer Bonide Products moved into new premises, an important consideration was the selection of mixing equipment for the firm's granular and powdered pesticides and herbicides.

Our business is pretty heavily regulated by the Environmental Protection Agency and by the states," says Munson Machinery's president Jim Wurz, "and we have to meet a guaranteed analysis for our products. If we don't have a homogeneous mix and they test a sample that doesn't meet the standard, we're in trouble." The company apparently made the right choices, as its annual sales have been growing in double digits since the move, says Wurz. As for meeting standards, Bonide has "never had a problem with product quality for at least 20 years that I know of," he says.

Founded by Wurz's grandfather and great-uncle in 1926, Bonide formulates 120–150 pesticides, herbicides and related products in granular or dust form, and a similar number of liquid products. These are sold through garden shops and other stores throughout the USA. Maintaining consistent quality is trickier for solid than for liquid products because it is more difficult to obtain an even mix of the various components, whose representation in a

batch ranges from kilograms to a few grams.

Bonide strives to maintain quality by strict process control. Diluent or carrier materials, such as corn cob, clay, vermiculite, limestone and talc, are received in truckloads and pneumatically blown into silos located outside the production building.

When a new batch is needed, the operator inputs the formula into the process-control computer and the required amount of carrier material is transferred pneumatically to a rotary batch mixer, which is mounted on load cells. The computer stops the flow when the charge reaches the preset weight. Other ingredients, such as the active ingredient, buffers, surfactants, fillers and pH adjusters, are weighed and added manually to the mixer—but again, the computer verifies that the necessary amounts have been added.

Solid products are formulated as granules or dust (fine powders). Following the mix-

ing operation, products designated as dust are transported pneumatically to an attrition mill that yields homogeneous fine powders, in some cases with particle sizes as small as a few microns. This product is transferred to a tote bin that serves the packaging line. Granular products go straight from the mixer to a tote bin. Except for the manual loading of lower-volume ingredients, the entire process is enclosed.

Mixing: the heart of the process

The mixing step is the heart of the process. Bonide uses four rotary batch mixers, all from Munson Machinery. Three of the machines, bought when Bonide started up its new facility, are the Model 700-TH-50-MS, which has a rated capacity of 1.42 m³



A negative-pressure feed hopper is used for the manual addition of small quantities of ingredients to the mixer.

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Fine powders are processed in the attrition mill and pneumatically conveyed to the packaging area.



The interior of the attrition mill is easily accessible for cleaning and maintenance.

and a total volume of 3 m³. The fourth machine is an older one with a rated capacity of 3.12 m³. This large machine and one of the smaller ones are used to mix granular materials, and the other two process dust products.

All the mixers have the same basic design, based on a horizontal drum that rotates on two oversized trunnion rings, located at either end of the vessel. At one end is a stationary inlet, and at the other a stationary outlet with a discharge gate. Material is charged via the inlet chute while the vessel is rotating. Mixing flights or baffles tumble the batch in a multi-directional manner, while simultaneously moving the material toward the outlet.

Bonide opted for the rotary batch mixers for their new facility mainly because they have had good results with similar machines over many years. "In our experience, they produce a homogeneous mix in a short period of time and they are easy to clean," says Wurz. "In the past we have tried other mixers, such as ribbon blenders and cone mixers, but we found that either they took a longer time to mix our products, or they were more difficult to clean." He adds that rotary mixers have also proved to be reliable, noting that Bonide has had the 3.12 m³-capacity machine for about 30 years. "We have had to have new trunnions put on it from time to time, but it still runs reliably."

The company produces roughly 45 t per week of granular and powder products, working one shift per day, five days a week. Batch sizes processed by the mixers average about 1,800 kg for granular materials and 900 kg for dust products. The optimum batch size is determined by the bulk density of the material, says Wurz, adding that "mostly we try to run with a full load."

Liquids too

While a batch is being mixed, liquid can be added to the particles via a tube, equipped with multiple nozzles, that runs along the center of the machine. In Bonide's case, the

liquid may be an active ingredient, a spreader-starter or a dust-inhibitor. The liquid is stored in a small tank outside the machine.

Bonide has several different sizes of nozzles to suit different liquids. "You can set the nozzles for the spray pattern and the spray time that you want," says Wurz. "The nozzles are set at strategic locations so that you get a good distribution of the spray." He adds, "We try to work it so that we don't change the nozzles too often, although it only takes about 20 minutes."

The time required to obtain a thorough mix is rarely more than 15 minutes, he says, and the company schedules production runs so that a particular machine is processing batches of the same or a similar product, to avoid or minimize cleaning between batches. However, even when complete cleaning is required, it rarely takes more than half an hour, he says, because the machine is easy to clean. "We rinse it with a solvent, or sometimes just use the carrier material, and clean out the nozzles by spraying a detergent through them."

Dust products, as noted, go to an attrition mill prior to packaging. The mill, also made by Munson, uses one stationary and one rotating disk to obtain a homogeneous mix of fine powder. "It gives us a finely ground product with a consistent particle size," says Wurz.

Bonide has 13 filling lines for its final products: three each for granular and dust products, and seven for liquid products. The company also has a small but growing business with contractors, to whom it sells products in 22.7 kg bags. "We are working to expand that business," says Wurz, "and if things go as planned we will probably need a couple of larger rotary mixers, with capacities in the 4,540 kg range." *kem*

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