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CHUTE HANDLE
UP - DISCHARGE
DOWN - LOAD/MIX



- Thoroughly blending wood powders
- Selecting sanitary processing equipment

MIXING AND BLENDING

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Case history

Mixer thoroughly blends wood powders

A wood product processor installs a rotary batch mixer to ensure a thorough, consistent blend.

The Willamette Valley Company (Wilvaco), based in Eugene, OR, is a global corporation that manufactures a range of wood products. For one product, the company mixes a fine mesh bark powder from the western red alder tree with other wood material to produce a dry powder blend for use as a filler in plywood adhesives.

In order for the powder to be used in these adhesives, the material blend must be pure and of a consistent quality. The material is mixed differently for each customer and will clog filters and shut down lines if it's not properly blended. On a similar process line, Wilvaco was using a ribbon blender to mix the material, but the blender left behind a lot of material with each batch and had a throughput of just 2,000 pounds per batch.

Because the equipment was too inconsistent for the company's material, Wilvaco talked to another branch of the company and learned about a rotary batch mixer from Munson, a mixing and blending and

size reduction equipment supplier based in Utica, NY.

The supplier's rotary batch mixer features a stationary inlet at one end and an opposing stationary discharge spout with a plug-gate valve at the other end. A rotating drum sits in between. Material is added via the inlet chute while the drum is rotating. Internal mixing flights create a gentle, four-way mixing action that tumbles, folds, cuts, and turns the material.

This process provides free space between particles and causes them to recombine 288 times per minute without freefall, which can damage the material. The flow pattern also creates ideal conditions for spraying liquid coatings, flavors, colors, and other additives onto a large area of moving material to rapidly achieve batch uniformity.

When the blend is complete, a gate at the discharge pivots into the blending chamber and directs the material flow down the discharge spout. The rotary batch mixer



Mixing flights inside the mixer's rotating drum lift, cut, fold, and tumble the material to achieve complete blend uniformity.

blends material uniformly in about four minutes and has a throughput of 6,000 pounds (2,721 kilograms) per batch.

The mixer is able to continue rotating during loading and discharging, which prevents segregation when mixing materials with varying densities and yields a homogeneous blend. This is important because the wood powder particle sizes can be as small as 200 mesh (74 microns) and must be uniformly blended without densification.

The constant rotation also means that energy consumption remains stable and relatively low, especially when making multiple batches of the same blend. The mixer also has a “soft-start” motor and a slow mixing speed, which further increase energy savings.

Material handling system feeds mixer

When tree bark arrives at Wilvaco's plant, operators run the material through a grinder at 3,600 rpm for cleaning and size reduction. The moisture content of the bark is

usually between 45 and 60 percent, so the powder is transported to a dryer to reduce the moisture to 6 or 7 percent. The dried bark powder is then loaded into a distribution bin and conveyed to one of three PLC-controlled hoppers supplying the mixer.

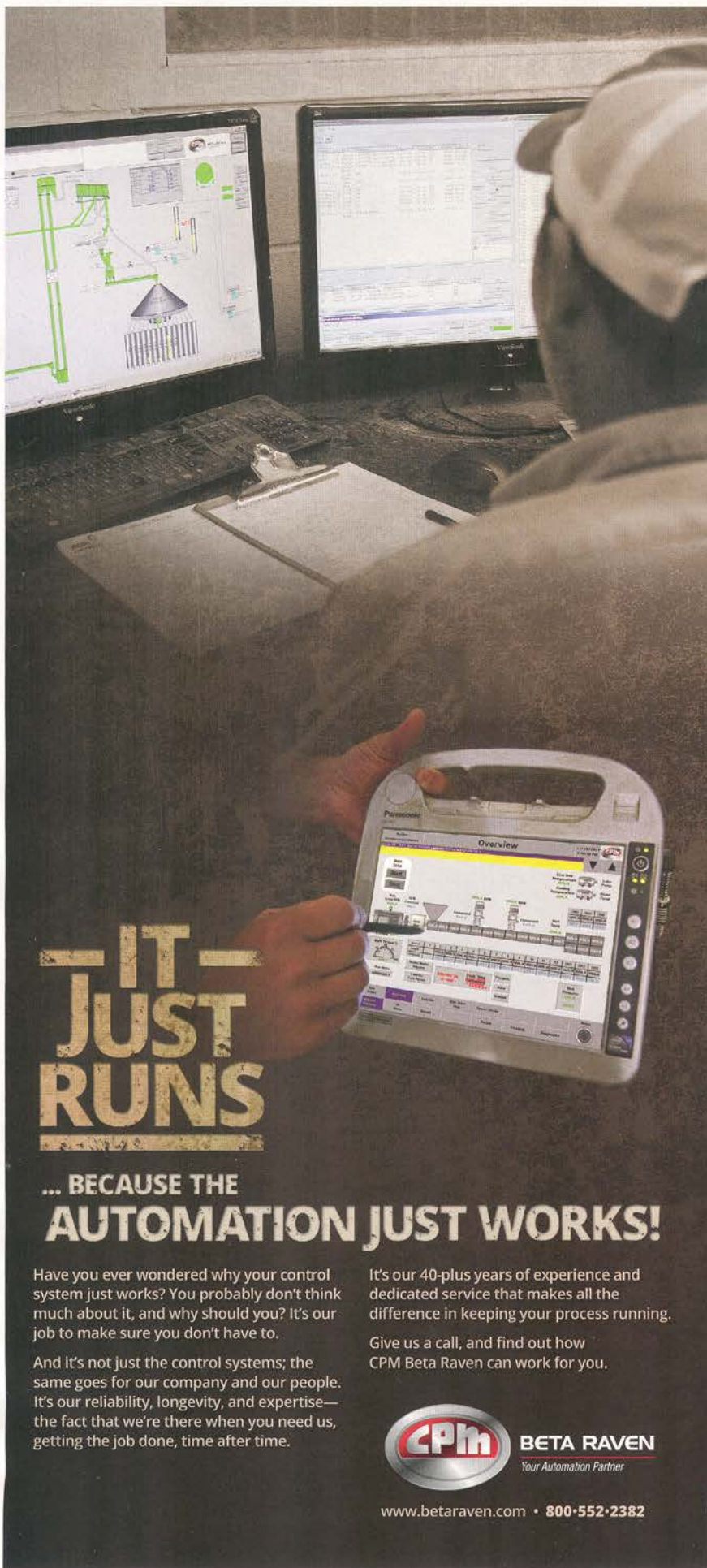
Each hopper has a 3,000-pound (1,362-kilogram) capacity and is mounted on load cells. A rotary airlock at each hopper outlet discharges material into the mixer's inlet chute after an operator selects a recipe on the computer and starts the mixer. The PLC receives weight-loss information from the load cells and automatically stops the rotary valve once the accurate batch weight has been discharged.

As the mixer's drum rotates, the mixing flights lift, cut, fold, and tumble the material, achieving complete blend uniformity in 1 to 3 minutes. The internal flights also elevate the material for discharge through a pneumatically actuated plug gate valve, leaving no residual material other than fine dust, which can be vacuumed away when the mixer shuts down for material changeover. A side access door

The rotary batch mixer blends material uniformly in about four minutes and has a throughput of 6,000 pounds (2,721 kilograms) per batch.



The rotary batch mixer thoroughly mixes each blend and leaves behind little to no material between different batches.



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Wilvaco blends wood material of varying particle sizes to produce a uniform dry powder blend for use as a filler in plywood adhesives.

provides access to all interior surfaces for cleaning and inspection.

From the mixer discharge, a pneumatic conveyor transports the final blends 14 feet (4.3 meters) vertically to an overhead weigh hopper equipped with load cells and a rotary valve discharge. From there, material is filled into 50-pound (23-kilogram) paper sacks or 3,000-pound (1,362-kilogram) bulk bags under PLC control.

Wilvaco continually tests batch samples and double checks its powder blends to ensure consistent quality. The new system is capable of blending 48,000 pounds (21,792 kilograms) of material in an 8-hour shift.

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Note: Find more information on this topic in articles listed under “Mixing and blending” in *Powder and Bulk Engineering’s* article index in the December 2017 issue or the Article Archive on *PBE’s* website, www.powderbulk.com. (All articles listed in the archive are available for free download to registered users.)

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