Milling and Grain est: 1891

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CASE STUDY

Wheat for glue blended six times faster with rotary batch mixer

Idaho Milling and Grain has produced wheat flour since 1982 in a process that involves measuring, milling and mixing. But this is not a refined baking flour for cookies and cakes. Instead Idaho Milling and Grain produces industrial-grade wheat flour that is formulated into a glue extender for the wood products industry.

Wheat flour and other ingredients are fed from bins into the 3.1 cu m capacity Rotary Batch Mixer, which loads, mixes and discharges each batch six-times faster than the company's ribbon blender.

Glue extenders are used to bond thin sheets of layered wood veneer that form structural plywood. These rugged compounds are also key elements in adhesives, sealants, coatings, plastics and cleaning compounds. Idaho Milling was able to reduce glue extender production time from 2 hours to 20 minutes per batch cycle by replacing its existing ribbon blender with a Munson model 700-TS-110-MS Rotary Batch Mixer. The company increased product quality and practically eliminated residual material in the machine after each batch.

Tumble, turn, cut and fold action produces uniform blends

The flour production process begins when raw wheat stock arrives from local farms during harvest. The wheat is tested for moisture and protein, blended to target protein content, and cleaned to remove foreign seed, sticks, chaff, and other residue. Afterward, it is tempered by adding water to toughen the bran coat. The wheat is then milled into glue extender by running it through a series of roller mills, sifters and purifiers. It travels by pneumatic line into the 3.1 cu m capacity Munson model 700-TS-110-MS Rotary Batch Mixer, where it is blended with other proprietary ingredients. The finished extender is then conveyed pneumatically to storage bins for packaging.

As Head Miller, Boyd Hess is responsible for production, maintenance and shipping. With a 28-year work history with Idaho Milling and Grain, Mr Hess credits the rotary batch mixer with blending flour at greater efficiencies and with significantly less residue than the company's previous, hand-fed ribbon blender.

"The rotary batch mixer produces much more uniform blends, even with diverse particle sizes and variations in bulk density," says Mr Hess. "This is due to the mixer's tumble, turn, cut and fold action achieved with proprietary internal mixing flights, and continuous rotation throughout the blending cycle."

"The blending system, from milled product through to packaging, is controlled by a programmable logic controller (PLC)," describes Mr Hess. A recipe is entered into the PLC which starts with a zero-scale reading from load cells under the 3.1 cu m capacity mixer. The pneumatic system feeds each ingredient from several bins through airlocks until all ingredients are added and the mixer load reaches its target weight. When the airlocks shut off, the mixing action begins, lasting from 3 to 10 minutes depending on the product density. Afterward, the mixer discharge gate opens, and the

The operator enters a recipe into the PLC, which controls the blending process from milling to packaging

The performance of many industrial adhesives relies on batch-to-batch uniformity of these glue extender ingredients

discharge airlock valve meters the material to the pneumatic line to the packaging area until the load cells again indicate zero weight. The glue extender is packaged in 23 and 45 kilogram bags and bulk bags up to 1361 kg.

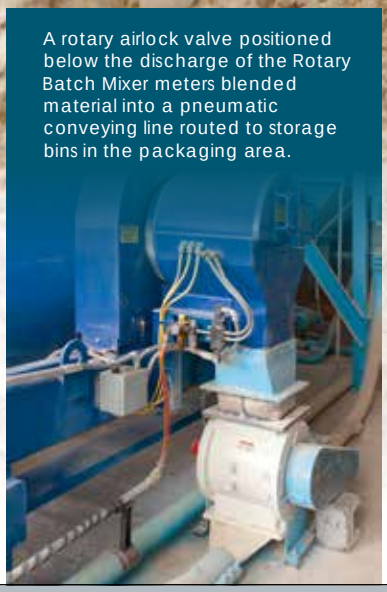
Two-hour production run shrinks to 20 minutes

A 1361 kilogram batch of formulated wood products extender is loaded, mixed and discharged for packaging in less than 20 minutes. "The batch size varies depending upon the recipe, and the rate of charge and discharge through the airlock system," says Mr Hess, "but the entire operation is quick and energy efficient."

"We can fill, blend and empty the mixer in less than 20 minutes for most formulations versus a typical batch cycle time of 2 hours using the ribbon blender. That machine was limited to a smaller batch size of about 453 kg and required 37 kw compared to 15 kw for a 1361 kg batch in the Rotary Batch Mixer.

"Another plus," says mix master Hess, "is that there is nearly complete discharge without residue. In filling a 1361 kg bulk bag, only one or two kg of residual material remains in the mixer, if that," he says.

Finished blend of glue extender ingredients



A rotary airlock valve positioned below the discharge of the Rotary Batch Mixer meters blended material into a pneumatic conveying line routed to storage bins in the packaging area.

A 15 kw motor is sufficient to tumble 1361 kg batches in Rotary Batch Mixer, whereas a 37 kw motor was required to drive agitators through 453 kg batches in the company's Ribbon Blender.