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Munson mixer improves performance at wheat plant

A Munson rotary batch mixer has refined a US company's wheat processing operation, with a tumble, turn, cut and fold action producing a uniform blend of wheat flour for use as a glue extender.

The finished blend of glue extender, which is a uniform mix of a number of ingredients (below).

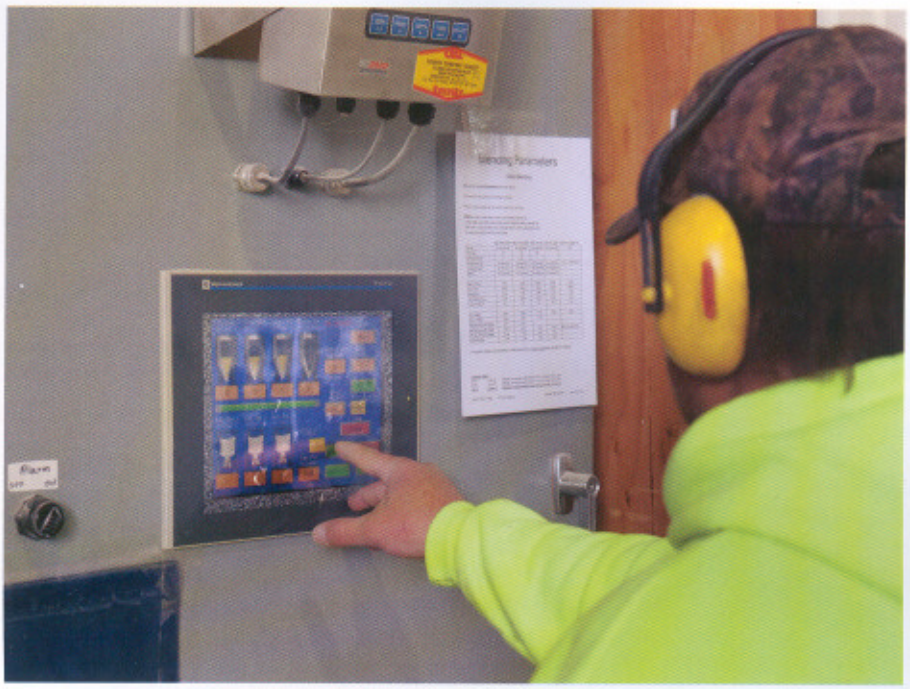
Idaho Milling and Grain has produced wheat flour since 1982 in a process that involves measuring, milling and mixing. But this is not a refined baking flour for cookies and cakes. Instead Idaho Milling and Grain produces an industrial-grade wheat flour that is formulated into a glue extender for the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

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.

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.

A 15kw motor is sufficient to tumble 1361kg batches in the rotary batch mixer, whereas the company's mixing master says a 453kg batch in the ribbon blender needs a 37kw motor.

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.



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

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 700-TS-110-MS rotary batch mixer, according to the mixer's manufacturer, Munson.

Munson told ABHR that the company increased product quality and practically eliminated residual material in the machine after each batch.

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 a 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 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, 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," Hess says. "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). A recipe is entered into the PLC which starts with a zero-scale reading from load cells under the 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 between three and ten minutes, depending on the product density. The mixer discharge gate then opens, and the 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 45kg bags and bulk bags up to 1361kg.

Production run reduced

A 1361kg batch of formulated wood products extender is loaded, mixed and discharged for packaging in less than 20 minutes, according to Hess.

"The batch size varies depending upon the recipe, and the rate of charge and discharge through the airlock system," he says, "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," he adds.

Hess says the ribbon blender is limited to a smaller batch size of about 453kg and requires a 37kw motor, compared to the 15kw motor needed for a 1361kg batch in the new mixer.

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

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