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INSIDE: RYE WHISKEY, GERMAN BREWERS ... AND SOME BRAINS



The Centri-Sifter centrifugal sifter separates about 3400 kg per week of fine grain particles from 8 Feathers stillage. The dewatered solids pass through the chute in foreground. The water gravity-discharges into the 7570L vat below

Stillage separation

Going green with centrifugal sifting

8 Feathers Distillery, founded in 2004 at Boise, Idaho, USA, produces premium whiskeys from locally-sourced grains, and water from a nearby artesian well. The company disposes of its grain slurry waste sustainably and economically by separating the grain from water using a centrifugal sifter. The grain is donated to a local farmer as livestock feed, while the water is treated before being safely piped into the public wastewater system.

Waste produced from the distillation process, called stillage, is about 40 percent grain solids and 60 percent water by weight, says distiller Greg Lowe. The distillery processes 1363kg

of grain weekly, which produces roughly 3,409kg of stillage.

A local farmer previously picked up eight 1136 litre totes per week of the watery grain mixture, but at 423kg, the totes were difficult to transport, and required covers to prevent spillage. "This wet approach would not scale for



8 Feathers Distillery produces small batch spirits made from pure water and locally sourced grains in Idaho. An artesian well underneath the distillery supplies high quality water

higher production," Lowe explains, so the grain needed to be separated from the water. To complicate matters, any water piped to the municipal wastewater treatment system needed to be free of solids content and have a pH in an acceptable range.

Multiple ways to separate grain from water evaluated

The stillage produced by some distilleries contains grain that remains intact and can therefore be separated from water using a settling and rinsing process called 'lautering.' However, the fine grain particles resulting from the grinding process employed by 8 Feathers precludes lautering as a means of separation.

Also ruled out was flocculation, which causes particles to clump using chemical additions that would render the dewatered grain unsafe as animal feed.

Mechanical separation emerged as the logical choice. Options included filter presses, screw presses, circular vibratory screeners and centrifugal screeners, Lowe said. "Initially, all mechanical options appeared as viable choices.

"The filter press offered excellent performance but the cost of the press, air diaphragm pumps to fill the press, and a compressor to run the pumps put the total cost at more than double that of a screw press or centrifugal separator," Lowe says. "Further, without adding some form of chemical solids coagulator into the flow, the filter cloths would require extensive cleaning after each use. Chemical use would also contaminate

the recovered grains sent for feed and raise the cost of continuous operation to an unacceptable level.

“We also considered screw presses, but smaller units that fit our budget and footprint were unavailable.

“This narrowed our choices to mechanical sifter-type separators. Kason Corporation manufactures both circular vibratory and centrifugal screeners, so we provided the company with a 38L sample of stillage for testing on both machine types in its laboratory.”

The circular vibratory unit proved unable to handle the 189 L/min infeed rate required to handle the stillage pump capacity, but the centrifugal screener handled the flow rate with capacity to spare.

8 Feathers purchased an MO-SS Centri-Sifter model with a 140 mesh (105 micron) heavy duty reinforced stainless steel screen to provide effective separation and minimise the risk of screen blinding.

Installing the sifter

Lowe says, “The results were as good as or better than anticipated. The sifter processed a 5678L test sample with 40 percent solids, fed at 151L/min without any degradation of performance. The separated grain was at an acceptable level of dryness for transport. After the test run, the unit was opened to inspect the screen for evidence of blinding, and none was found.”

Separating grain from water centrifugally

Installed 2.6m above the plant floor, directly over the vat that receives the water, the unit measures 533mm wide, 832mm tall and 1899mm long, including its 3hp (2.2kW) motor.

The water/grain mixture is fed by a lobe pump into the inlet at the upstream end of the centrifugal sifter, where a screw feeds the mixture into the open end of a horizontal screen cylinder. Rotating helical paddles propel the water/grain mixture against the screen, accelerating the passage of water through the screen and against the wall of the chamber which funnels the water by gravity through a 254mm outlet into a 7570L polyethylene vat below. It is further treated with soda ash to adjust pH before finally flowing into the public wastewater system.



Opening the hinged end cover of the centrifugal separator allows the paddle assembly and screen cylinder to slide off the cantilevered shaft

Grain solids unable to pass through screen apertures are propelled in a helical pattern through the screen cylinder until being discharged through its open end, into a chute that funnels the dewatered solids into a plastic tote on a pallet below. When a tote is full with about 1,136kg of the damp grain, a pallet truck replaces it with an empty tote. The full totes are stored in a holding area to be picked-up by a farmer.

The screener separates 83 to 125L/min of 40 percent solids (by weight) Lowe says. “For our solids content, the optimal rate is 76 to 95L/min.”

Cleaning and maintenance

The centrifugal sifter’s end housing can be opened, allowing tool-free

removal of the screen cylinder and paddle assembly from the cantilevered shaft for cleaning. However, operators simply backwash the sifter with water as it runs, cleaning the pipes and the screens at the same time.

“It takes two or three minutes and has worked well, eliminating the need to climb a ladder and physically access the machine,” notes Lowe.

He says no maintenance has been required, or reliability issues encountered. “We have not opened the door on that thing in six months,” he says.

Kason Europe Ltd.
+44 1782 597540
sales@kasoneurope.co.uk
www.kason.com



The sifter measures 1899mm in length including the 3hp (2.2kW) motor, and processes 189 litres of stillage per minute