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# ScreenTips

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## Flourmill Employs Centrifugal Force to Speed Up Separation of Bran from Flour

CHURCHSTOKE, WALES—Standing on the bank of a spring-fed pond in a green, wooded valley, the Bacheldre Watermill produces flour as it has off and on since 1575, grinding the wheat between traditional millstones and separating bran from the flour in a water-powered wooden screener, called a dresser.

Recently, though, the Bacheldre mill has made two concessions to modern technology. First the milling operation was disconnected from the old water-wheel and the two sets of French burr stones are now turned by a 50-hp electric motor. More recently, one of the mill's two dressers was replaced by an electrically driven centrifugal screener made by Kason Corporation. Called a CENTRI-SIFTER® screener, the machine has roughly 10 times the capacity of the two dressers combined and has proved to be more reliable, says Matt Scott, owner of the mill.

Bacheldre Watermill is a relatively small operation, but it has become famous for its high-quality flour since Scott bought it four years ago.

The mill produces a dozen varieties of flour, most of them organic, for which it has won a number of awards. Last year, the mill won the (U.K.) Soil Association's award for best organic flour. Scott has also increased production to 10 m.t./week, from 440 to 660-lb (200 to 300-kilos/week) when he took over. In November 2005, he came third in a U.K. competition for the best new business started up in the previous three years.

"Our grists are milled using traditional grinding stones to produce slowly and gently milled flour, which retains all the natural goodness of the wheat germ," says Scott. This time-honored process only slightly warms the flour, he says, thus leaving all the natural flavors intact.

Modern mills, he points out, use steel rollers to crush grain after it has been conditioned in water to avoid excessive heat buildup. Even so, he says, the heat can damage the wheat germ, so many companies remove it.

In Bacheldre's operation, grain is received in tanker trucks and bulk-blown into four silos, from which it is augered into a hopper in the mill. From the hopper, the grain is gravity-fed onto a scouring and separating screener that separates chaff from the grain. The machine, built in 1876 and now electrically powered, has two sloping, vibrating screens, located one above the other. Chaff is retained by the upper screen, which has a 5-mil mesh. Grain is collected on the lower, 2.5-mil screen, while fines fall through the screen.

The grain falls down the inclined screen onto a channel, which directs it into an open, rotating drum that has baffles and a wall perforated with holes of about 0.34-in. dia (1-cm dia). A fan removes residual dust and the grain falls through the perforations into an auger, which feeds a hopper above the millstones.

Bacheldre has two sets of millstones, as noted. Each consists of two flat,

## Vibratory Screener with Batch Hopper Feed Control

MILLBURN, NJ—A new Kason 3-in-1 System combines a VIBROSCREEN® vibratory screener, a batch hopper and an integral feed control device that regulates the flow of material into the screener. The system is intended for

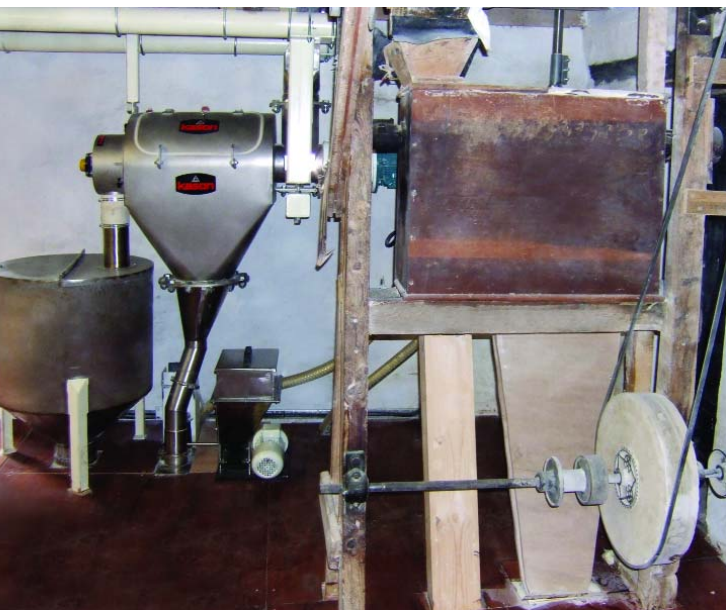


*Integral feed control device of new Kason screener regulates the flow of incoming material, eliminating the need for separate feeders.*

applications that require screening in batches. The feed control device consists of a circular disc positioned below the flexible connector at the screener's inlet, perpendicular to the flow of material. The diameter of the disc is smaller than the inside diameter of the inlet, forming an annular gap through which material can pass. Because the disc vibrates with the screener lid to which it is affixed, the flow of material through the gap remains uniform. Interchangeable discs in a range of diameters are provided to achieve various feed rates.

Vibroscreen vibratory screeners available with the feed control device range in diameter from 18 to 40-in. (460-mm to 1016-mm) and are offered with single or multiple screening decks, separating particles in one to five predetermined sizes from 2-in. (50-mm) to 500-mesh (25-microns).

The screeners are constructed of stainless steel to 3-A, cGMP, USDA, FDA or industrial standards.



*The new and the old. The electrically driven Kason centrifugal screener (left) operates next to Bacheldre Mill's old, water-powered wooden dresser.*

# Stainless-Steel Separator Proves Its Mettle in Classifying Abrasive Ferrotitanium Granules

DETROIT, MI—Ferrotitanium, an additive used in steel alloys, makes steel more ductile, which allows the formation of thinner body panels for automobiles and appliances, such as washers, dryers and refrigerators. As a result, the metal has played a significant role in reducing the weight of vehicles, thereby enhancing their fuel efficiency. However, ferrotitanium is an abrasive material that can tear up process equipment in the plants where it is produced.

Take the case of Global Titanium Inc., one of the world's top 10 producers of ferrotitanium. The company produces ferrotitanium in granular form for shipment to steel producers and the product was literally tearing holes in the screen separator used to classify the granules by size. The problem was solved by installing a new stainless steel separator made by Kason Corp.

Global Titanium buys titanium scrap around the world and blends it with iron to make ferrotitanium. The materials are charged to an induction furnace and reacted to form ferrotitanium at an average temperature of about 2,650°F (1,454°C). The metal is poured into molds to form ingots that are about 5 X 5-ft (1.52 X 1.52-m) and 6-in. thick (15.24-cm) and weigh 1,900 to 2,000-lb (862 to 907-kg).

Ferrotitanium is very brittle and starts to shatter as it cools, explains Adam Perry, Global's assistant operations manager. "We put the metal through two jaw crushers, then send it to the



*A view of the top of the separator and the feed chute from a different angle. The port through which large particles of ferrotitanium are removed is at the upper left.*

separator for classification to 8, 10 or 12-mesh, depending on what the customer wants."

The Kason machine is a VIBROSCREEN® classifier, a circular unit that can accommodate up to five horizontal screens. Material is fed to the top screen, which separates the coarsest particles, then progressively finer material is removed by the lower screens. The entire assembly is vibrated by a high-torque, 2.5-HP (1.87-kw) gyratory motor, located below the housing, and is supported by rugged springs that allow the machine to vibrate freely without transmitting vibration to the plant floor.

Global Titanium's classifier is made entirely of stainless steel and has two 60-in. dia (152-cm dia) screens, which separate oversized material for recycling to the crushers. Oversize particles migrate to the periphery of the machine and are discharged from a porthole into a chute. Finer material falls through the screen onto a deflector plate, which directs it to the middle of the next screen. The desired product is recovered from the bottom of the unit.

The VIBROSCREEN® classifier replaced an old separator that operated in a similar manner, but it was made of mild steel and the ferrotitanium tore holes in the sidewall. "We had to repair the machine about once a month," says Perry. By comparison, the stainless steel Kason separator has been online since the spring of 2004 and so far has shown no sign of wear. It was sold by Michigan Plant & Process Equipment Co., LLC.

Perry notes that the 60-in. (152-cm diameter) Kason machine also meets the company's production needs, which had outgrown the capacity of the old, 48-in. dia (122-cm dia) unit.

The Kason separator processes 1,200 to 1,500-lb/h (544 to 680-kg/h) of material, which is filled into 3,000-lb (1,360-kg) bags for shipment to Midwestern steel mills. A standard shipment is 45,000-lb (20,412-kg). The base of the machine is on a stand about 2-ft (61-cm) off the floor, to allow room for filling the bags. The product comes down the chute into the bag, which is set on a scale. The plant typically runs two shifts and sometimes three shifts.

Screens are changed regularly to match customer needs. For smaller particles, below 8 mesh, Global supports the fine screen on a heavier backup screen of larger mesh. "This allows us to add more weight and increase the capacity without damaging the fine screen," says Perry.

Global uses an identical VIBROSCREEN® separator for screening sponge titanium, which the company receives from customers and vendors as mixed scrap that ranges from fines to rock-like chunks. This material is passed across a magnetic drum to remove ferrous metal, then crushed to the customer's requirement, which may range from 10 to 60-mesh. Fines are mixed with other material in the furnace and made into briquettes.



*Ferrotitanium granules are fed from the yellow hopper to the stainless steel VIBROSCREEN® classifier, which uses successively finer horizontal screens to separate the metal into the desired size fractions.*



*The granules slide down a chute onto the separator's coarse top screen. Smaller granules pass through the screen and larger ones migrate to the periphery and are removed through the port at left foreground.*

## Gap-Free, Low-Profile Sifter

MILLBURN, NJ—A new low-profile “FLO-THRU” sifter from Kason Corporation features a gap-free screen frame with quick-disconnect clamps and a crevice-free interior finished to cGMP, 3-A, USDA and FDA standards, allowing rapid, thorough washdown.



*Kason's Quick Clean Low-Profile FLO-THRU Sifter features gap-free screen frames, quick-disconnect clamps, and a crevice-free interior, meeting cGMP, 3-A, USDA and FDA requirements.*

The low-profile configuration employs two unbalanced-weight gyratory motors mounted on opposing exterior sidewalls of the unit, instead of one motor positioned beneath the screening chamber, reducing minimum height requirements significantly. On-size particles pass rapidly through the screen in a vertical discharge path at higher rates than with circular screeners having centrally mounted gyratory motors and horizontal discharge paths. Oversize material can be removed manually or with a vacuum.

The unit can be disassembled with no tools for rapid sanitizing and is intended to scalp oversize particles as small as 38-microns (400-mesh) from dry bulk materials or solids-laden slurries.

The screen frame's interlocking flange fully envelops the support ring of the screen, allowing the wire mesh of the screen to fully extend to the interior walls of the frame, eliminating the gap between the screen ring and frame wall of conventional screeners where material would collect.

The gap-free design with sanitary finish can eliminate contamination due to bacteria growth while improving sanitizing efficiency, making it suitable for food, dairy and pharmaceutical products and for other contamination-sensitive products.

Screens are mounted to support rings using FDA-approved epoxy and sealed using FDA-approved gasket material, and can be provided with a mesh-tolerance certificate. The wire mesh screening material is offered in 304, 316 and “magnetic” 400-series stainless steel that can be captured by a downstream magnet if broken.

The sifter is offered in diameters of 24, 30, 40, 48 and 60-in. (610, 762, 1016, 1219 and 1524-mm). It can be equipped with either single or twin imbalanced-weight gyratory motors, and furnished with a dust-tight cover.



*The screen frame's interlocking flange, secured by quick-disconnect clamps, fully envelops the support ring of the screen, allowing the wire mesh of the screen to fully extend to the interior walls of the frame, eliminating the gap that exists between the screen ring and frame wall of conventional screeners.*

## Largest Australian Screener at Cargill Beef



*At 84-in. (2134-mm) in diameter, this Kason model K84-1-SS (foreground) is reportedly the largest circular screener made in Australia.*

TAMWORTH, AUS—Cargill Beef Australia began screening meat meal at its Tamworth plant using the largest circular vibratory screen separator manufactured in Australia, according to Tim Mellor, sales & product manager for Rendertech Ltd. of Chelsea, Victoria, licensee of Kason Corporation.

The screener is a stainless steel 84-in. (2134-mm) diameter Kason VIBROSCREEN® model K84-1-SS equipped with a 3-hp (2.2-kW) unbalanced weight gyratory motor, stainless steel screen with .09-in. (2.2-mm) apertures, ball tray anti-blinding device and splash cover.

According to Bruce Collier, Cargill's rendering supervisor, the unit has a throughput of 2 to 3.5 tons of meat meal per hour and is installed adjacent to a 60-in. (1524-mm) Kason VIBROSCREEN® model K60-1-SS that screens fines from tallow. The smaller unit is equipped with a .017-in. (0.42-mm) aperture screen, Klean Screen anti-blinding rings, splash cover and 2.5-hp (1.85-kW) gyratory motor.

## Parting Shot of Outbound Equipment: Ultra-Sanitary Batch Sifters



These mobile Ultra Sanitary Batch Sifters, bound for a pharmaceutical manufacturer, feature a domed housing, stainless steel motor, stand, tri-clover inlet and outlet flanges and vertical quick-disconnect clamps, all of stainless steel with continuously ground and polished welds, and a gap-free screen frame and crevice-free interior, meeting FDA, USDA and cGMP standards. All are mobile and can be disassembled with no tools for rapid sanitizing.

*Flourmill cont. from page 1*

circular stones, located one on top of the other. The upper one, called a runner stone, rotates (hence its name), and the bottom one (the bedder) is fixed. Grain is fed from the hopper, through a hole in the center of the upper stone, and is ground into flour between the stones. The flow from the hopper is controlled by a mechanical device attached to the mill's drive shaft that beats against a loose-fitting shoe at the hopper's outlet. The ground flour emerges around the periphery of the millstones, where it is gathered up by a paddle attached to the runner and drops through a hole, either into a sack or into a vacuum system that takes it to storage.

*A view of the mill's main shaft, with its crown wheel, on the middle floor at the Bacheldre Watermill. The millstones, encased in wooden housings, are on either side of the shaft.*



The mill was using two old, water-powered wooden dressers to separate the bran, but (as noted) one of those units has been replaced by the Kason machine, a Model KO CENTRI-SIFTER® screener. It is driven by a 2-hp motor and can process up to 1,540-lb (700-kilos/h) of flour. In contrast, the old dressers can each process only about 880-lb (400-kilos/day) in winter and 330-lb (150-kilos/day) in summer, when there is less water available. The capacity of each mill is 330 to 440-lb (150 to 200-kilos/h), depending on the type of flour produced.

The CENTRI-SIFTER® screener is a compact centrifugal machine with a cylindrical sifting chamber that houses a cylindrical screen of nylon mesh. Flour is fed pneumatically into a vertical feed inlet at one end of the unit, then redirected by a feed screw

into the chamber, which is in the horizontal plane.

Rotating helical paddles within the chamber continuously throw the flour against the screen, while the resultant centrifugal force on the particles accelerates them through the openings. The rotating paddles, which never make contact with the screen, also serve to break up soft agglomerates. The separated flour falls down through a spout and is transported by vacuum to a bagging hopper. Oversized particles (bran) continue through the chamber and are ejected via a discharge spout into a sack and shipped for animal feed.

The Bacheldre mill uses two sizes of nylon screens: of 250-micron for white flour, and 550-micron for durum and brown flours. Screens are available for the CENTRI-SIFTER® screener in various other materials, including other types of monofilament cloth, woven wire in selected metals, perforated plate and wedge wire. Scott chose nylon because "we tried it and it worked well," says Scott.



*Some tasty samples of bread made from Bacheldre's Organic Stoneground Strong Unbleached White flour, a package of which is at the rear.*

In the mill, the new sifter is located next to the remaining water-powered wooden dresser, which is still used for white and durum flours. The dresser is housed in a rectangular wooden box and operates on a similar principle to the CENTRI-SIFTER® screener. A rotating shaft, powered by a water wheel via a pulley, runs the length of the box's interior. The shaft is equipped with brushes and is surrounded by a cylindrical sieve of stainless steel.

Flour is blown pneumatically through an inlet in the top of the box at one end and passes along the interior of the sieve. As it flows along the cylinder, the flour is pushed through the sieve by the rotating brushes and drops into a bag. Bran passes to the far end of the sieve, where larger holes allow the bran to pass through for bagging.

Besides having a much higher throughput than the water-powered machine, the CENTRI-SIFTER® screener is more reliable and does a better job of separating bran from flour, says Scott. "The old machines broke down about every couple of months and it typically took a day to take a machine apart and fix it. Also, we get a cleaner separation, and it only takes about 15 minutes to change a screen."

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