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News and application reports on screening, sifting, scalping, dewatering, and fluid bed drying, cooling, moisturizing

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Reliability high on Alaskan brewery's dewatering requirements

JUNEAU, AK — Nearly any expansion of a process entails chess-like considerations — where to add space, what equipment to install, how to arrange it, when will it pay back, and how it will impact the waste stream.

But when the plant is located in an extremely remote area, advanced planning and reliable equipment takes on added significance.

Such is the case with the Alaskan Brewing Company, which in 1986 became the first US brewery in Alaska. Winning more than 50 awards for its bottled beer since opening, the company's rapid growth called for the addition of a 100-barrel brew house in 1995. A year later, an automated keg line was added for

The waste stream enters the unit on the right, through an upper port not seen behind the tubular support leg, and is propelled on an incline to increase dwell time and moisture removal.

filling stainless steel "Sankey" kegs which, combined with a new bottling line added in 2001, provided sufficient capacity for the company to serve the entire West Coast.

Beer making begins with cooking grains. Between batches, the brew vessels must be cleaned and rinsed. According to Plant Manager Curtis Holmes, as production grew, "a lot more grain was going down the drains and into the wastewater system's settling tank." A pump on the bottom of the tank pulled off waste sludge, but "the bigger grain kernels settled down to the bottom of the tank and packed in densely, bonding with the sludge and setting up like concrete. The mass could be pumped with difficulty, but sometimes the combination would jam the pump. Then we would need to remove, service and reinstall the pump."

The problem was resolved with an inclined Centri-Sifter® centrifugal dewatering screener from Kason, installed in the waste stream between the brew vessels and the treatment plant. As solids-laden wastewater flows into the screener, a full-length, low-pitch auger moves the material longitudinally into and through an inclined cylindrical screen. Helical paddles rotating within the screen create centrifugal forces that accelerate the liquid and fines through the screen

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Ultra-Sanitary Sifter

A new FDA, USDA and cGMP compliant Batch Sifter from Kason Corporation meets the most stringent sanitary requirements, including pharmaceutical standards for injectable products.

The dust-tight pharmaceutical sifter has a stainless steel housing, motor and stand, tri-clover inlet and outlet flanges, vertical quick-disconnect clamps and continuously ground and polished welds.

The unit features a gap-free flange arrangement where the screen support ring interlocks with the upper and lower frames of the screener. The design allows 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 otherwise collect.

The unit scalps oversize particles down to 25 microns (500 mesh) from dry bulk pharmaceutical powders or solids-laden slurries, and can be disassembled with no tools for rapid sanitizing.

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, if broken, can be captured by a downstream magnet.

The sifters are offered in diameters of 18, 24 and 30 in. (450, 610 and 750 mm), and can be equipped with either single (shown) or twin imbalanced-weight gyratory motors.

The gyratory motor imparts multi-plane inertial vibration to the spring-mounted screening deck. 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.

Kason's Ultra-Sanitary Sifter features all-stainless construction with ground and polished welds, vertical quick-disconnect clamps, a gap-free screen frame and domed, crevice-free interior, meeting the most stringent sanitary requirements.

Novel Size Reduction and Classification of Recycled Glass Yields Profitable Products, Eliminates Landfill Costs

The remote Isle of Lewis, in Scotland's Outer Hebrides, seems an unlikely place for technological innovation, but the island's capital of Stornoway is the site of an unusual glass-recycling operation. The plant is novel in that it economically converts a relatively small volume of waste bottles and jars into a variety of products, some of them quite valuable.

Owned and operated by the Western Isles Council, the plant started up in April 2004 and has a nominal throughput of about 2-tonnes/h. In contrast, conventional recycling plants may process up to 30 m.t./h, says Howard Graham, president of Technical Engineering Services (U.K.) Ltd. (Carlisle), who provided the equipment and built the Lewis plant. These plants, he explains, are typically located in heavily populated areas and waste containers often have to be transported long distances, typically to remelt plants, which is costly.

The Kason classifier is a vibratory separator that contains several screens to separate material by size. The unit is vibrated in an eccentric manner by a gyratory motor and is supported by rugged springs that allow free movement.

The plant employs two basic processes: a glass-breaking and grinding system made by Glass Aggregate Systems (Faribault, MN, USA; www.glassagg.com), and classifying equipment from Kason Corp. (Millburn, NJ, USA; www.kason.com) that separates the glass into the desired sizes. The classifier is the key element because it allows the plant to make relatively valuable products for the local market, says David MacLeod, senior recycling officer for the Western Isles Council.

Previously, Lewis was landfilling all its glass containers because the cost of shipping the glass to the mainland for recycling was about double the market price of the waste material. Graham notes that about 70% of the glass that is recycled in the U.K. is used as aggregate in road making and the rest is re-melted for bottle-making, and glass sold for these applications sells for as little as £5 ($9)/tonne. On the other hand, land filling was an unsatisfactory disposal method in Lewis because landfill space had become increasingly expensive and the dumping cost had increased to £41 ($77)/tonne from about £28 ($52)/tonne less than two years ago. "We expect the cost to go to about £60 ($112) per tonne by 2010," says MacLeod.

The new plant can produce not just aggregate and remelt material, but various higher-value products for other uses. Initially, the plant has been producing decorative glass for landscaping, which sells for about £50–60 ($94-112)/tonne. Other product grades are being test-marketed as shot-blasting material and as filtration media for potable-water treatment plants. Glass used for these purposes sells for £100 ($187)/tonne or more, says Graham.

"Our main interest is to avoid sending material to a landfill, but this process also gives us an opportunity to make saleable products."

The plant cost approximately £60,000 ($112,000) and the total operating cost is about £6–7 ($11-13)/tonne, says MacLeod. "We haven't done a detailed cost-benefit analysis, but we expect the plant will pay for itself in a few years," he says. "Our main interest is to avoid sending material to a landfill, but this process also gives us an opportunity to make saleable products. If we were a commercial organization, this would definitely have the potential to be a profitable process."

Incoming bottles are loaded into a hopper, from which they drop onto a vibrating tray that controls the flow of bottles onto a conveyor belt. Although the system is designed for processing bottles that have been separated from other municipal waste, it can also remove metal cans, plastics and other material accidentally mixed with the feed.

First, ferrous metal is picked off the belt by a magnetic drum and sent to a dumpster. The bottles and extraneous material are conveyed to a popper unit, which uses rotating hammers to shatter the glass into pieces no larger than 2 to 3-in. (50-75 mm) in diameter. Next, a shearing unit (a rotating drum with a fixed blade) liberates the glass from paper labels and foil, after which the material flows onto a revolving cylindrical screen called a trommel. The glass particles drop through the screen into a sanding unit and the rest of the waste continues across the screen and is ejected into a bin.

In the sander, the glass is ground into particles that have no sharp edges and range in size from about 0.75-in. (19 mm) to dust that is less than 0.12-in. (3 mm). Finally, the Kason classifier does the critical job of separating the glass particles into the necessary size fractions for the desired applications. This is no easy task, since the material is abrasive and may blind screens, particularly if it is wet or contains residue.

The Vibroscreen classifier, as it is called, is a vibratory screener that consists of up to five circular, horizontal screens located one above the other in a vertical, cylindrical housing. Mounted to the bottom of the unit is a high-torque, 1-HP gyratory motor with a double-extension shaft at both the top and bottom ends of the motor. Eccentric weights are fitted to each extension to give the motor an imbalanced-weight gyratory




The glass products separated by the Kason classifier range from dust and fine material that can be used for shot-blasting to decorative glass for landscaping.

motion. The entire unit is supported on a circular base by rugged springs that allow the screen assembly to vibrate freely without transmitting vibration to the plant floor.

Material to be separated is fed onto the center of the top screen, whose mesh is the largest. Oversize particles are moved to the screen periphery in a spiral pathway, and discharged through an outlet, while undersize particles drop through to the next screen. The mesh sizes become progressively smaller toward the bottom of the unit.

Separation is enhanced by the three-dimensional motion generated by the unit's gyratory motor. The motor's top eccentric weight generates a horizontal flow to the screen assembly, while the bottom weight creates a high-frequency tilt on the screens. The combination of the horizontal and vertical movements creates a tangential action that moves oversize material laterally across a screen and encourages undersized particles to flow through the screen. The machine can be optimized for a particular application by varying the mass of either eccentric weight.

In the Lewis installation, the Vibroscreen classifier is a 48-in. (1220 mm) diameter unit with four screens that can process up to 3 tonnes/h of glass aggregate. The top screen scalps pieces of glass ≥0.51-in (13 mm), along with residual rubbish, and the other screens sequentially separate out glass particles ≥0.39-in (10 mm), ≥0.24-in (6 mm) and ≥0.12-in (3 mm). Dust is collected at the bottom, as noted earlier. Material ≥0.51-in (13 mm) is used for decorative glass; ≥0.24-in (6 mm) glass for water filtration or road aggregate; and ≥0.12-in (3 mm) for weather protection in the cement walls of houses. In the latter application, called "rough casting," the glass particles are thrown against a wet cement wall and become embedded. Particles ≥0.12-in (3 mm) can also be used for shot-blasting, as can the dust, which produces a smoother finish.

In the case of shot-blasting, glass is attractive "because it makes less airborne dust than other materials," says Graham. "Also, we have found that when you shot-blast with glass you use less material because it's more aggressive." He points out that the UK has banned the use of sand for shot-blasting because it causes silicosis. "Other materials can be used, such as iron foundry or copper slag, but glass is less expensive.

Glass is also finding applications as a water filtration medium, where it substitutes for sand or diatomaceous earth. "The advantage of glass is that is more easily back-flushed," says Graham.

The equipment used in the Lewis plant has proved to be "robust and reliable," says MacLeod, and there have been "no problems of any significance. I think our only downtime has been when we have had an odd bit of stone mixed with the glass and we have had to stop the operation to clean the stones from the conveyor."

The Vibroscreen classifier uses screens made of a special stainless steel that resists abrasion. Screen-blinding is precluded by means of a Kason "Ball Tray Anti-Blinding Device" that utilizes the multi-plane inertial vibration of the screener to bounce elastomeric balls between the upper "operating" screen and a lower coarse-mesh "ball screen," thereby dislodging near-size particles from apertures of the upper screen.

Glass bottles and jars of all kinds, with labels and metal foil attached, are the feed for the Lewis glass-recycling plant.

The plant has attracted a lot of attention because of increasingly strict environmental regulations and the value of the glass products. Graham notes, for example, that the Republic of Ireland has banned landfilling of bottles and that the British Government

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Fluid Bed Processor with Air-Lift Device Speeds Cleaning, Inspection

Circular, vibratory fluid bed dryers, coolers and moisturizers from Kason Corporation are available with a new Air-Lift device that allows rapid disassembly, cleaning and inspection of the fluid bed processing chamber.

The interior of the unit is easily accessed for thorough wash down by loosening one clamp ring assembly that connects top and bottom housing sections, then activating the Air-Lift device to raise the upper section.

Lifting the upper frame/cover assembly of the fluid bed processor pneumatically provides fast, easy access to the unit's interior, and allows one operator to perform what was previously a two-person task, depending on diameter of the unit.

The self-contained system is comprised of a circular fluid bed processor, heating/cooling/moisturizing unit, blower and cyclone separator on a single skid. With on-site connections to a power source, bag house and material inlet/outlet, the system is ready to run. At less than half the size and weight of rectangular fluid bed processors of equivalent capacity, the circular fluid bed unit allows all primary system components to be consolidated on a shippable frame for the first time.

Inherent strength of the circular processor eliminates the need for heavy-gauge walls and cross braces otherwise required to withstand continuous vibration, allowing vibratory motors to be downsized. The circular unit also requires only one air inlet and outlet and has fewer weld seams, reducing overall size and construction cost, especially when finished to 3-A, FDA, and BISSC sanitary standards.

The circular fluid bed processing system dries, cools or moisturizes bulk chemicals, minerals, stone products, foods, dairy products and pharmaceuticals on a batch or continuous basis, for low-capacity laboratory and pilot plant testing to high-volume applications.

This Air-Lift Device of this 48" (1219 mm) diameter Fluid Bed Processor enables one operator to perform screen changes, washdowns and inspections with minimal downtime.

The Air-Lift device is available on fluid bed processors in diameters from 18" to 84" (460 mm to 2135 mm). Other options are available for de-lumping, agglomerating, scalping or powder coating of bulk materials in conjunction with fluid bed drying, cooling or moisturizing. Rental units equipped with the Air-Lift device are inventoried in 18" and 24" (460 mm and 600 mm) diameters for laboratory and pilot plant testing.

Brewery from page 1

apertures and onto the interior wall of the screening chamber. The paddles, which never contact or scrape the inside of the screen, also serve to breakup soft agglomerates. The variable-incline design of the unit increases the dwell time of material within the chamber and, accordingly, the amount of liquid removed from the solids, which are ejected through the open end of the screen cylinder and transferred to the brewery's waste grain dryer.

The brewery decided against rotary drum screeners due to the loudness of their chain drives and their large size, which would have precluded access

A view into top of a brew vat, showing the solids that must be washed away between brewings.

needed for maintenance in the restricted installation space. Currently, the brewery produces about 500,000 bottles of beer per week, generating roughly 6,000 gallons of wastewater from the brewhouse vessels from which the Centri-Sifter screener removes about 800 lbs of solids. This "saves us a lot of headaches with our wastewater plant," says Holmes.

The Alaskan Brewery dewatering screener is equipped with 200-micron screens that operate without particulate

At the Alaskan Brewing Company, weather factors into plant operations.

"blinding," according to Holmes. To determine the appropriate screen size, the brewery drained a prescribed volume of slurry from a brew vessel, allowed the heavier solids to settle and drew off a measured amount of liquid. The solids-laden material remaining was frozen and shipped overnight to the Kason laboratory, where liquid was added to reconstitute the slurry. The procedure served to keep the solids wet, maintain its structure and allow the lab to conduct tests with greater accuracy than if dry, uncooked grains had been provided.

Brewing beer in the last American frontier may seem romantic, but the Juneau location incurs logistical challenges. The 2700 square mile city and borough of Juneau has a population of over 31,000, and the pure water from the surrounding icefields and glaciers is ideal for beer production; however, the ice also blocks road access to major highways leading to the rest of Alaska and beyond. Shipments are transported mostly by water and typically depart from Seattle on a barge that docks in Juneau every five days, so supplies and equipment must be ordered two to three weeks in advance. And the weather always has the last word.

The Centri-Sifter screener's design made installation a simple "plug-and-play" operation, which saved Alaskan Brewing Company some additional capital. "We did our own install," remarks Holmes. "We very rarely have crews come up — housing costs are prohibitive, especially if the project is large. And since Juneau doesn't have a large industrial base to begin with, if someone comes up but leaves some tool back at the office, they're just out of luck." Not that folks aren't willing to come up and help out, notes Holmes, although the offers always seem to coincide with summer, when the fishing is best…a pastime that often goes hand-in-hand with a good beer.

Glass from page 3

requires hotels and clubs of a certain size to recycle 40% of their packaging. Also, companies that install recycling plants or use recycled glass may be eligible for grants from the European Union or national grants.

Scotland, for instance, has set up a Strategic Waste Fund within the past year to provide financial help for recycling operations. "We were too early to qualify for that," says MacLeod, "so our plant was funded through our own budget."

Incoming bottles drop through the hopper onto a belt that feeds the popper unit and sander (right rear), which break the glass into particles of .75 in. (19 mm) or less. The glass is then fed to the Kason classifier (left rear).

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