Air Process Systems
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Manufacturers' Representative

Food & Beverage
Solutions Sourcebook

Application Notes for Implementing Equipment and Processing Systems involving Vibratory Screeners, Centrifugal Sifters, Static Sieves, and Fluid Bed Dryers/Coolers/Moisturizers

Food & Beverage **Solutions Sourcebook**

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Why Kason? Over 50 years of experience, knowledge, innovation and adherence to quality.

Kason Corporation is an innovative and sustainable partner for the world's top pharmaceutical, foodservice, chemical, plastic, energy, mineral, aerospace, and defense industry customers. We are proud to provide solutions across the globe that customers can depend on, developing decades-long relationships. As a leader and dominant supplier in the customizable sifting and drying industry, no one understands and anticipates customer needs like Kason. Only Kason offers the widest selection of screening, drying, cooling and processing equipment in the world, complete with complimentary testing and on-site trials. Only Kason provides a variety of screens for specific applications whereas our competitors only offer one type of screen for all applications. And unlike our competitors, only Kason provides the highest quality, proactive, solution specific equipment, tailored specifically to our customers' applications. Our approach to screening and processing equipment is constantly shifting to reflect the emergent needs of existing and developing markets that increase performance and eliminate downtime. Our dedicated support team truly listens and finds out what is essential to your team and your applications—now and into the future. From there, our support team works in tandem with our experienced craftsmen to innovate and engineer endless customizable possibilities that help support and advance your unique growth opportunities.

We are consistent.

From our sales team to the manufacturing floor, every Kason product is engineered and inspected to ensure top quality and that it adheres to the most stringent of standards. As proven through our laboratory testing, only Kason products are guaranteed to outlast the competition so you can outlast your competition. Your customers depend on you. **Depend on Kason**.

THE KASON ADVANTAGE:
DYNAMIC. DEPENDABLE. CUSTOMIZABLE.
Proven success in providing screening and processing solutions.

Spray Drying and Screening of Foods, Pharmaceuticals, Nutraceuticals

Equipment	VIBROSCREEN Circular Vibratory Screener
Application	Screening Flavor, Fragrance, Pharmaceutical & Powder Products
Features	304 SS Contact Parts

Repose piles show cranberry powder, copper solution for vitamins and chlorophyll powder— several of the powders produced by Summit Custom Spray Drying.

Summit Custom Spray Drying produces spray-dried flavors, fragrances, cosmetics, nutraceuticals, and pharmaceutical-grade materials.

The GMP-compliant, FDA-registered facility, a wholly owned subsidiary of SummitReheis (www.summitreheis.com), produces powdered solid particles from solutions, slurries and emulsions, and employs a Kason vibratory screener to ensure that particle sizes meet tight tolerances.

"When fully operational, three spray dryers will produce several hundred different spray-dried powders for diverse customers," says Kevin Kimmick, Summit Custom Spray Drying Director of Process Technologies. "Runs can be small as pilot studies, to as large as 150,000 lb (68,100 kg) at the production level for a major firm."

"Our expertise in spray drying and equipment selection, as well as the specialized knowledge of our experienced staff, qualifies us to serve these sensitive industries," he says. "To eliminate any possibility of contamination, we will not accept hazardous or toxic materials such as herbicides or pesticides. And we have specifically designed our equipment to be easily and thoroughly cleaned."

Testing determines process conditions

Kimmick has 23 years of experience and is highly skilled in spray drying.

"Although spray drying is based on scientific principles, our test procedures enable us to determine and control optimum conditions according to numerous variables," he says.

Before accepting an order for a new material, the company performs laboratory and pilot plant testing using raw materials and formulas supplied by the customer. "This allows us to determine whether or not we can effectively spray dry the material," he explains. "It also helps us to develop a cost estimate for the process. If the results of the tests are favorable, we then transition directly into production."

Spray dryer separates solids from liquids

A typical order begins with delivery of bulk quantities of raw materials by the customer. "Solids are stored in a warehouse in the original containers in which they were delivered. Liquids are stored in either drums, totes, or in separate holding tanks before being introduced into a mixing tank," he says.

"If the mixture needs to be emulsified, it will either be pumped through a high-pressure homogenizer (up to 500 psi [35 kg sq cm], or transferred to a homogenizer tank that has a fixed rotor-stator. The completed emulsion, solution or slurry is then transferred to a holding tank with continuous mixing. From there, a feed pump meters the solution or emulsion into the spray-drying chamber, where the solids and liquids are separated."

In the mixing room, an operator empties ingredients into the batching tank according to the customer's recipe.

Slurry from the batching tank (R) is pumped to the feed tank (L) where it is metered into the spray dryer.

"All the action happens in the vicinity of the atomizer, whether it is a centrifugal wheel or a nozzle," Kimmick continues. "Selecting the proper equipment and determining the optimum settings and adjustments are the keys to successful spray drying. For example, various sizes and

configurations of the spray nozzle can be selected to control particle size and density. When choosing process temperatures, you need to strike a fine balance between overheating the spray particles and having them stick on the wall of the dryer."

Circular vibratory screener removes oversize particles

Once the materials have been separated and dried in the spray dryer, they are conveyed to a rotary airlock. The particles pass through a rare earth magnet and are then fed into a Kason VIBROSCREEN circular vibratory screener to remove agglomerates, flakes, lumps and any sheets or layers that may have formed on the side walls of the spray dryer. The screening chamber is suspended on rugged springs that allow it to vibrate freely while minimizing power consumption and preventing transmission of vibration to the floor. One imbalanced-weight gyratory motor creates multi-plane inertial vibration to the screen deck, controlling the flow path of material on the screen surface and maximizing the rate at which material passes through the screen. The on-size material exits through a discharge spout located at the screen's periphery. Particles smaller than the screen apertures pass through and exit through a lower discharge spout that feeds the packaging machinery.

Downstream of the spray dryer, a Kason screener removes oversize particles. Because of the company's expertise in spray drying, "overs" (spout at right) comprise a small percentage of the total batch.

A Kason vibratory screener with circular 80 mesh (178 µm, 0.0070 in.) screen is inspected between production batches of fragrance powders.

The screener's 30 in. (76.2 cm) diameter screens are interchangeable, and range from 20 mesh (864 µm, 0.034 in.) to 60 mesh (234 µm, 0.0092 in.). "We're currently testing an application that would require use of a 200 mesh (74 µm, 0.0029 in.) screen, and Kason is helping us explore several techniques for prevention of screen blinding," he says.

"Oversize materials removed by the screener usually amount to a few pounds, accounting for a relatively insignificant percentage of the total batch weight. This is evidence of our skill and expertise in optimizing the spray-drying process," says Kimmick.

On-size material is packaged in a variety of containers ranging from 25 lb to 200 lb (11.3 kg to 90.7 kg) boxes, bags or fiberboard drums, or bulk bags weighing as much as 2000 lb (907 kg).

Processes meet sanitary standards

Because many of the materials processed by Summit Custom Spray Drying are food or pharmaceutical ingredients, the facility operates under Good Manufacturing Practices (GMPs), is registered with FDA and USDA, and is qualified to process to Kosher standards.

A campaign can be as short as one shift or as long as one week. Between campaigns, operators clean all the spray-drying equipment, including the screeners, with hot water, followed by a cleaning agent, and then a sanitizing agent. As a result, the screeners routinely pass Hazard Analysis & Critical Control Points (HACCP) inspection.

Bags of dried, screened powders are ready to be shipped to customers.

Kimmick anticipates adding more spray dryers and screeners as demand for its services grows. "We currently serve dozens of customers and anticipate a customer base of over a hundred," he says.

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Ingredient Screening Upgrade Boosts Pet Food Production, Cuts Labor, Improves Quality

Equipment	VIBROSCREEN Bag Dump Screener
Application	Dumping & Sifting Dry Pet Food Ingredients
Features	Integral Dust Collection

Freshpet, a processor of high-end refrigerated dog food, replaced manual screening equipment it had designed, built and installed, to clear a production bottleneck, reduce heavy lifting and improve product quality.

Established in 2005 by dog lovers John Phelps and Scott Morris, Freshpet produces products under two brand names for nationwide distribution through approximately 3,000 retailers. “Dog Rolls” are available in one-pound through six-pound chubs and “Fresh Bites” are meatballs for dogs. All of the products, which are marketed in supermarkets under the “Freshpet Select” brand and in specialty pet retailers under the “Deli Fresh” name, are made from fresh ingredients, including chicken, carrots, peas and rice, and contain no byproducts, fillers or preservatives.

DIY screening

Freshpet sifts and screens dry ingredients to maintain particle size uniformity, remove clumps and incidental foreign material prior to mixing the ingredients with meat protein. The company’s maintenance staff had designed and built a

20 in. x 20 in. (508 x 508 mm) sifting screen that could handle about 10 pounds (4.5 kg) of ingredients at a time, and an employee had to manually push the ingredients through the screen with a scraper. “Our guys went to a local box hardware store for the materials. It was a real do-it-yourself affair.”

“It was a sturdy little screen and kind of ingenious in its way,” explains Michael Hieger, Freshpet’s general manager, “but we were having issues with small clumps in our dry ingredients. It would take us upwards of one hour to manually sift enough dry ingredients for one batch.”

The company decided to upgrade the screening process for this and several other reasons: 1) It was forced to hire temporary help for screening when an employee could not be spared from another processing line, 2) Dry ingredients are supplied in 50 lb (23 kg) bags which are too heavy for some workers to lift and pour onto the screen, and 3) Ingredient uniformity. The manual process “did not produce the kind of uniformity we wanted in our dry ingredients,” explained Hieger. “The quality wasn’t there.”

From hours to minutes

Freshpet purchased a mobile, circular vibratory, bag dump screener from Kason Corp. that discharges into the feed hopper of a flexible screw conveyor. The screener is a VIBROSCREEN Flo Thru (low profile) model with a single-deck 30 in. (762 mm) diameter screen and built-in dust collector.

A worker now dumps a full bag of dry ingredients onto the screen that, at half the height of Freshpet’s homemade screener, reduces physical effort, while the dust-containment system improves safety and plant hygiene. The screener employs two imbalanced-weight gyratory motors, mounted externally on opposite sides of the screener, to impart multi-plane inertial vibration that maximizes the rate at which particles pass through or across the screen surface. Material

Mobile 30 in. (762 mm) diameter vibratory bag dump screener sifts dry ingredients prior to mixing them with meat protein.The waist-high unit minimizes physical effort in bag dumping, and includes a built-in dust collector.

An operator weighs the amount of ingredient to be screened.

Screened dry ingredients are conveyed into a mobile bin that is wheeled to the processing side of the plant

Mobile bins of screened material are wheeled to the processing side of the plant.

clumps and foreign material discharge through an "overs" discharge spout at the screen's periphery, while on-size particles (<=5.66 mm) gravity discharge at a rate of 50 lb/min (23 kg/min) into a flexible screw conveyor that is 6 in. (152.4 mm) in diameter, 6 ft (1.8 m) long and inclined at 45-degrees. Screened material is conveyed into mobile bins that are wheeled to the "processing" side of the plant for blending with proteins and cooking.

Mobility was important because the screening operation runs on an as-need basis, and Freshpet wanted the option to use the space for additional purposes, and to empty the area for washdowns between shifts.

"What used to take us an hour now takes 10-15 minutes, and one person can easily lift 50 lb (23 kg) bags to the height of the low profile screener," explains Hieger, adding, "The efficiency gained by the system is such that Freshpet's production would have to increase a large amount before the screening operation once again bottlenecked production."

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Screening Lumps and Foreign Particles from Sugar

Equipment	VIBROSCREEN Hi-Capacity Screener
Application	Scalping Granulated Sugar for Loading Trucks & Railcars
Features	High-Capacity, Dust-Tight

The facility's VIBROSCREEN screeners separate sugar lumps (right) from grains

The New York, Susquehanna and Western Railway (NYSW) transports a variety of commodities to its bulk transfer facilities located in the heart of the metropolitan New York market and in upstate New York. One of these NYSW units is **Susquehanna Bulk Systems**, a food-grade bulk-transfer

SBS Sparta receives dry-bulk granular sugars in covered hopper railcars.

facility in Sparta, NJ. SBS Sparta specializes in transferring dry-bulk granular sugars from covered hopper railcars into bulk trailers that carry the materials to their final destinations. In the last five years, SBS Sparta has transferred over 215,000 tons of sugar, according to Craig Hemsworth, office manager at the facility.

Inside a 5000 sq ft (465 sq m) building that holds two railcars, sugar is transferred using one or both of two parallel auger systems. To start the transfer process, a bootjack is elevated until it comes in contact with the bottom of the railcar to be unloaded. Then sugar drops through the sealed opening in the bottom of the railcar and into an under-track auger, which moves the material into a vertical auger. This auger moves the sugar up into an overhead horizontal auger above the truck into which the material will be loaded.

One step remains before the sugar can be fed into the truck. "Sugar tends to lump up, so our customers require the sugar to be sifted to screen out the lumps," Hemsworth explains.

Two 60 in. (1524 mm) diameter Kason VIBROSCREEN screeners are used to load trucks with sugar at the SBS Sparta facility.

Each of the high-capacity discharge VIBROSCREEN units can screen up to 36 tons/hr, allowing trucks to be rapidly loaded with sugar.

To remove lumps from granular sugar, the overhead auger feeds the material into a 60 in. (1524 mm) diameter, 3 mesh, VIBROSCREEN circular vibratory screener from Kason Corp. An unbalanced-weight gyratory motor mounted directly beneath the screening chamber produces both vertical and horizontal vibration of the device's spring-mounted screening deck. The vertical vibration causes sugar particles to pass through apertures in the screen at high rates, while the horizontal vibration moves sugar lumps across the screen in controlled pathways until they exit through a spout at the periphery of the screen and drop into a tailings bin to be discarded.

Besides removing lumps, the process screens foreign objects mixed with the sugar. "If there's a rock or other debris in the sugar, the screener will remove it," Hemsworth says.

Overhead horizontal augers move sugar into the two VIBROSCREEN screeners in the facility. Each screener separates sugar lumps from grains by vibrating a single spring-mounted screening deck located in the upper part of the unit. The vibration is produced by rotation of an unbalanced-weight gyratory motor located below the screening chamber.

Rotation of the screener's motor produces both vertical and horizontal vibration of the screening deck. Vertical vibration causes sugar particles to pass through apertures in the screen at high rates. These particles exit the screener through a discharge spout. Horizontal vibration moves oversize particles to the periphery of the screener, where they exit the device through a chute.

After exiting the screener, sugar passes through a rare earth magnet, which removes any metal filings that might be in the material. The screener and magnet are critical control points in SBS's HACCP program. These points must be identified and maintained as required by the American Institute of Bakers.

The truck rests on a scale under the screener, which sits on two steel beams about 15 ft (4.5 m) above the floor of the enclosed loading bay. On-size material ejected through the screener's bottom discharge port, passes through the magnet below the port, and drops into the truck. Oversize material exiting the screener's upper discharge port passes through a 4 in. (102 mm) diameter chute, and drops into the tailings bin.

Oversize material falls through a 4 in. (102 mm) diameter chute and drops into a tailings bin.

The SBS Sparta facility was designed to accommodate two parallel systems for moving sugar, allowing simultaneous loading of two trucks and continued operation if one system goes down, according to John Fenton, vice president of marketing and sales for the NYSW.

In the facility's early years, however, only one of the systems was functional. To make the second system operational, new owners of the company installed a second 60 in. (1524 mm) diameter VIBROSCREEN screener with a 3-mesh screen. Like the first screener, the second was purchased through Cino Equipment, a Kason representative in Berkeley Heights, NJ. "Since our first Kason sifter was problem free, we purchased another," Hemsworth says.

Subsequently, one customer requested finer screening, so the company replaced one of the 3 mesh screens with a 6 mesh screen. This system discharges into trucks parked on a 120 ton scale in the loading bay.

Hemsworth says the facility typically screens about 120 tons of sugar a day, "but we've done up to 20 loads a day almost 500 tons using both sifters."

Each of the high-capacity VIBROSCREEN units can screen up to 36 tons/hr. The rate at which material passes through the screeners depends in part on the last time they were cleaned. In conformance with GMP requirements, SBS cleans the screeners with steam and hot water either once a week or after a load. Personnel inspect the screeners after every loading operation to see if immediate cleaning is required. All material contact surfaces are of 304 stainless steel.

Other than cleaning, the screeners require no regular maintenance. As for repairs, Hemsworth adds, they have been limited to single instances of replacing the springs and redoing the motor windings on the older of the two units. "After 15 years, I guess you have to expect something to eventually wear out," he says.

At the SBS Sparta facility, sugar is transferred from railcars to bulk trailers that carry the materials to their final destinations.

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Vibratory Screener Improves Feed Consistency for Dry Pasta Production

Equipment	VIBROSCREEN Circular Vibratory Screener
Application	Screening Durum Flour & Dried Pasta
Features	Dust-Tight Design; Anti-Blinding Device

The Church of Jesus Christ of Latter-Day Saints established the **Deseret Pasta Plant** in the 1960s to produce dried pasta for relief and humanitarian efforts. The plant increased production capacity with the purchase of used processing equipment in 1975. Over the years antiquated equipment has gradually been replaced, beginning with two new Buhler presses and dryers in 1980.

A 48 in. (122 cm) circular vibratory screener sifts up to 2,000lb/hr (907kg/hr) of durum granular flour. Auger conveyor transports a small amount of recycled, ground pasta to the feed hopper.

"As we began the most recent process upgrades, we discovered we needed better refinement of our feed," says Glade Thompson, Director of Maintenance at the Deseret plant, "so we decided to replace the pre-war vintage gyratory sifter." The old sifter had been modified and repaired so many times that no clues remained as to its origins.

Operator checks flow of durum granular flour and recycled ground pasta into feed hopper, rotary airlock and 48 in. (122 cm) screener below.

After investigating both gyratory and vibrating screen sifters, Thompson opted for a 48 in. (122 cm) diameter Kason VIBROSCREEN circular vibratory screener that uses multi-plane, inertial vibration to separate byproducts and large particles from the feed to the pasta presses.

The vibratory sifter is an in-line unit containing one or more circular screens of specified sizes. Feed drops by gravity into the center of the top screen and an imbalanced weight motor on the bottom of the unit rotates to produce both horizontal and vertical vibration. The feed either passes through the screen or travels across it in controlled pathways to exit at the side. A gyratory sifter may use square, rectangular or horizontal screens in a stacked deck. The drive produces a horizontal circular motion to stratify the feed. With no vertical motion, long particles remain flat on the screen and do not pass through.

Feed to the Deseret pasta process consists of fresh durum granular plus a small amount (1-4%) of regrind-recycled pasta ground in a hammer mill to the proper size and mixed into the feed. Fresh feed is pneumatically conveyed in a 2-1/2 in. (6.4 cm) pressurized line from two 60,000 lb (27,216 kg) fresh silos through a dust collector and rotary airlock valve into the feed hopper.

Regrind is mechanically conveyed via a 4 in. (10.2 cm) diameter auger conveyor to the feed hopper. The mixture is then metered through a rotary airlock valve into the vibratory sifter at a rate of 1,800-2,000 lb/hr (816-907 kg/hr) on a continuous basis.

A 48 in. (122 cm) circular vibratory screener replaced a vintage gyratory sifter, decreasing waste and saving time and labor in re-screening rejected material.

Sifted feed exits the screener through another rotary airlock and is pneumatically conveyed in a 2 in. (5.1 cm) line under pressure to two 1,500 lb (680 kg) mixer storage tanks. From there it feeds both the short- and long-goods pasta production lines, where it is mixed with water to

Operator checks flow of durum granular flour and recycled ground pasta into feed hopper, rotary airlock and 48 in. (122 cm) screener below.

make dough, extruded into pasta, cut to the proper size, and dried. Material screened from the feed exits the screener's discharge spout into a box and is manually recycled into the feed hopper.

Although the plant is relatively small compared to large commercial pasta producers, each line has a capacity of 650 lb/hr (295 kg/hr) and total plant output exceeds 2 million lbs (910,000 kg) of pasta annually.

Consistency of the feed particle size is critical for quality pasta production, with a coarse grind producing the best pasta. Durum wheat is used because it is the firmest wheat and when milled produces a very granular product with a minimum of fines. The durum granular used at the Deseret plant has a particle size distribution range of #100-#30 mesh US sieve (0.0059-0.0234 in. or 150-595 microns). It is fairly consistent in particle size, but irregular in shape, with some particles that are oblong, broken, or geometric. The material passed through the old gyrating sifter so quickly that a portion of the irregularly shaped on-size particles were being discharged along with oversize particles, requiring rescreening of the rejected material.

Thompson says he was looking for a sifter with more capacity and more opportunity for the product to contact the screen, plus the ability to control the flow. He chose the VIBROSCREEN sifter over other types because the feed residence time can be easily adjusted by removing or adding weight plates on the imbalanced counterweight system on the gyratory motor mounted below the unit. Greater residence time allows more usable product to pass through the sifter, decreases waste, and saves time and labor in recycling. Thompson estimates the savings at about 0.5% of the feed.

The vibratory sifter requires just one screen of #35 mesh (0.179in or 150 microns) to scalp any large particles or foreign objects in the flour. An even more consistent particle size could be achieved by installing additional screens. Although it is not currently a problem, if in the future feed quality changes and there are too many fines, it is possible to add another screen to separate them.

Space considerations were another reason for choosing the circular vibratory screener. It just fit into the available space with engineers making some alterations to get it into place. According to Thompson, a gyratory sifter of the same capacity would have required 3-4 in. (8-10 cm) greater circumference because of its motion during operation. The configuration of the sifter, with its input straight down in the center of the unit, also helped it fit into the space.

Finally, Thompson noted that the VIBROSCREEN sifter has improved sanitary conditions in the plant, with much less leakage than with the gyratory sifter.

The Church of Jesus Christ of Latter Day Saints seeks to abate suffering everywhere, among any people. Relief efforts include feeding the hungry worldwide, and the operation of its own food production and processing plants has enabled the Church to expand emergency response for famine victims and disasters such as the tsunami in Southeast Asia and Hurricanes Katrina and Rita on the U.S. Gulf Coast.

Dried pasta and other food products are shipped worldwide for hunger relief.

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Distillery Turns Stillage Waste into Revenue with Centrifugal Sifter

Equipment	CENTRI-SIFTER Centrifugal Separator
Application	Dewatering Stillage Waste
Features	Heavy-Duty Wedge Wire Screen & Proprietary Paddle Assembly

Bendt Distillery produces 'premium hand-crafted spirits that stay true to traditional distilling'.

Bendt Distilling Company, a maker of handcrafted whiskeys, uses a centrifugal sifter to turn spent grain byproduct into saleable livestock feed, while recovering the liquid sour mash, a valuable component in the distilling process.

Founded in 2012 by Natasha and Ryan DeHart, Bendt Distilling currently produces 1200 barrels per year of straight whiskeys and whiskey blends, employing traditional distillation methods.

Dewatering stillage centrifugally

Grains including wheat, rye, barley malt, oats, corn and triticale (a hybrid of wheat and rye), are ground to the consistency of coarse flour, then mixed with water, cooked, mashed and fermented. After fermentation, the strip run (first round of distillation) separates out the alcohol from the fermented mash. The remaining grain/water mixture called "stillage" consists of water containing 5 to 10 percent grain solids.

In its watery state, the stillage is a waste product to the distillery but contains enough grain and nutrients to be useful to farmers as livestock feed. Originally, Bendt pumped the stillage into a 20-cubic yard disposal container for pick-up by farmers at no charge. This saved the company disposal costs as long as the stillage was collected. If it wasn't, the company had to pay to have it hauled away.

In researching a solution, DeHart read about another distillery's use of a centrifugal sifter to dewater stillage. He contacted the manufacturer, who evaluated Bendt's application and recommended a Kason model MO-3BRG.

Oversized grain solids exit through downspouting into an enclosed container. Recovered liquid (sour mash) gravity feeds through the center discharge, is stored and added to subsequent fermentation batches.

The stillage now accumulates in a 10,000 gal (38,000 l) holding tank, and is pumped about once a week into the centrifugal sifter. The water/grain mixture passes into the sifter's horizontally-oriented cylindrical screening chamber where rotating helical paddles accelerate the mixture against the screen by centrifugal force. Liquid passes through the screen, exits through a flanged discharge chute at the base of the sifter and flows into discharge piping.

Oversize grain solids are propelled along the cylindrical housing until they exit the downstream end of the cylinder and gravity feed into a 20 cubic yard (15.3 cu m) enclosed container. The centrifugal sifter operates at a rate of 30-40 gal/min (114 to 151 l/min), so emptying the tank takes four to five hours.

The unit is 74 in. (1880 mm) long, including its motor, and 32 in. (813 mm) high. The stainless steel wedge wire screen is sized at 140 mesh (105 micron).

The CENTRI-SIFTER centrifugal sifter at the distillery runs at a higher voltage than normal in order to screen heavy, sludgy stillage.

After dewatering, the grain still contains about 80% water but has a texture "you can hold in your hand," DeHart says. A full container holds about 15 tons (13.6 m.t.) of grain, which is the yield of 20,000 gal (75,708 l) of stillage.

The liquid, called sour mash, is recovered and stored to add to subsequent fermentation batches. "Using sour mash saves water, provides flavor consistency, and naturally adjusts the pH," Ryan DeHart says.

The sifter cleans easily as the front access door (left) opens for internal components to slide from a cantilevered shaft. The top access port permits quick rinse of the screen.

Customizing the solution

Working with Kason's applications engineers, Bendt Distilling Company identified solutions for problem areas, such as dealing with the sludgy consistency of the stillage at the bottom of the holding tank, which could cause the sifter to stall, and dealing with stillage containing corn (a byproduct of bourbon production), that holds more water than the other grains and tends to become spongy.

Kason's solution was to run the 230-460V 3-phase motor more efficiently at a higher voltage by adding a transformer to step up the voltage. For the corn stillage, changing the screen mesh size and installing a higher-pitch paddle assembly pulls the stillage across the screen cylinder effectively while maintaining the same throughput and de-watering performance without any clogging or imbalance, allowing unattended operation.

Ease of cleanout was a big factor in choosing the sifter, DeHart says. "We can clean it quickly, getting to all the pieces. With the three-bearing design, the front of the sifter opensfor cleaning and changing parts. Internal components slide freely from the shaft."

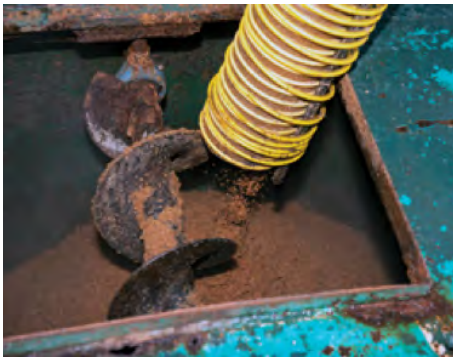
The sifter's compact design was also important for the distillery, as was its low power requirements "with just a 3 hp (2.2 kW) motor," DeHart says. Heavy duty construction also suited the distillery as the sifter is installed outdoors. Finally, DeHart appreciates that the unit is relatively quiet.

"We're really happy with the setup," DeHart says. "It's a good low-cost solution compared to what else is on the market for separating the grain at a fast speed."

Turning an expense into revenue

Partnering with a national feed company, the distillery worked out an agreement with a local cutting horse farm to take the spent grain. Under a profit-sharing agreement with the feed company, the distillery receives income in addition to having the spent grain hauled away at no cost.

The Kason centrifugal sifter has provided a "win-win" solution, DeHart says. "A waste byproduct for us is a useful product for somebody else."



Dewatered grain (stillage) having approximately 80% moisture content is utilized for animal feed.

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Toll Processor Meets Food Specs with Centrifugal Sifters

Equipment	CENTRI-SIFTER Hi-Capacity Centrifugal Sifter
Application	Sifting Dry Powders
Features	High-Capacity; Dust-Tight; 304 SS Contact Parts

PacMoore Products, Inc. is a contract food manufacturer that processes, packages, re-packages and warehouses products to customer specifications. Founded in 1989, the company operates a manufacturing facility in Hammond, IN that mainly performs dry blending and consumer packaging, and another in Mooresville, IN that performs spray drying and food extrusion for items such as protein fortified crisps, snacks, cereals, and TVP. The company also owns and operates a small extrusion innovation lab in Gridley, IL.

CENTRI-SIFTER centrifugal sifters screen ingredients to meet particle size requirements and maintain product quality. At right, 50 lb (23 kg) bags of ingredients await sifting.

Jose Ramirez, Manager of Engineering and Maintenance in Hammond says, "Ingredients typically arrive in one package format and leave in another. We sift, blend, repackage and ship to customer manufacturing facilities or directly to retail stores."

The plant handles a variety of ingredients including plant proteins, bakery mixes, flour blends, drink mixes, starches, sweeteners, fibers, gums, cocoa blends, protein crisps and rice.

Ingredients typically arrive in 50 lb bags, bulk bags, bulk trucks or rail cars. End products intended for retail sale leave the facility in pouches, direct-fill cartons, bag-in-box or other retail packaging, explains Ramirez. Small retail pouches range in size from 4.5 oz (619 g) to 5 lb (2.3 kg). Packaging for products that customers will use in further processing could be 30 lb (13.6 kg) bag in box, 50 lb (23 kg) bags, bulk bags, or whatever customers specify.

Sifting meets customer specs

A rectangular sifter pre-screens the bulk ingredients, which gravity discharge into the mixer. When the customer's process dictates it, liquid is added and the mixture is blended until uniform. "Sometimes moisture can produce agglomerates or larger chunks of material," says Joseph Williams, Engineering Manager at PacMoore Process Technologies in Mooresville, IN.

To maintain high throughput and product integrity immediately prior to packaging, the Hammond plant installed two Kason Centri-Sifter centrifugal sifters. A high capacity Model YOB-SS with a 7.5 hp (5.6 kW) motor is dedicated to the Hammond baking soda line that packages product for retail sale. A smaller 3 hp (2.2 kW) Model MO-SS is mounted on a mobile platform to insert into a second production line for products requiring sifting after blending. The Mooresville plant also has a portable 3 hp unit performing final sifting when needed.

"Final centrifugal sifting guarantees the product coming out of the blender is at the right classification. This granule size is very specific and typically requested by the customer," Ramirez explains.

Centrifugal sifting maintains high throughput and product integrity at PacMoore's Mooresville, IN plant. Screened product gravity-discharges through a central chute.

Blended material entering the centrifugal sifter is metered by a rigid auger into a horizontally oriented cylindrical screen, as rotating helical paddles tipped with nylon brushes create centrifugal force that propels the material against the screen.

On-size material passes through the screen and gravity discharges into a bagger. The centrifugal action also serves to break down soft agglomerates into on-size particles. Oversize particles are propelled in a helical path until they exit the downstream end of the cylinder where they discharge by gravity into an "overs" receptacle.

Rotating helical paddles create centrifugal force that accelerates on-size material through the screen, while propelling oversize particles through the downstream end of the screen cylinder. Nylon brushes affixed to the paddles prevent screen blinding.

"A lot of the material passing through the screens can be clumpy. In a regular screener, material would build up, blind the screen, and slow our throughput, but the self-cleaning nylon brushes on the rotating paddles keep the screen clear of buildup," says Williams.

Screen mesh size depends on customer requirements. "Different products necessitate different screen sizes, so we provide several options," Ramirez says, and "screen changing takes no more than two minutes."

For the baking soda line at Hammond, baking soda arriving in rail cars is transferred to a process tank and, in turn, to the dedicated centrifugal sifter. The sifted baking soda is conveyed by rigid auger to direct-fill carton equipment which fills retail packaging in sizes from one to four lb (0.45 to 1.8 kg), Ramirez explains.

Evaluating centrifugal versus vibratory sifting

Circular vibratory sifters were considered for these duties, Williams said, but centrifugal sifters proved the better option for final sifting where the material can be clumpy and build up on the screen.

Williams points out that rapid sieving action was another requirement to avoid bottlenecks in the process. "If we used a regular sifter like a circular vibrating screener, product clogging the screen would slow the sifting rate and the whole process."

Also important for the application was high strength construction to withstand jolts encountered by the mobile sifters, and the continuous duty required of the permanently installed unit on the baking soda line.

Portability placed additional constraints on the choice of sifters. They needed to be small enough to mount on moveable platforms, and to minimize vibration to prevent shaking of the platforms.

"The hinged door and cantilevered shaft of the Quick-Clean design allow operators to quickly remove the screen cylinder and paddle assembly without tools. This allows cleaning and inspection more easily than flat deck sifters, which is critical in food applications," says Ramirez, citing cross contamination as the most common reason for product recalls in the industry.

The screens last for years, reports Williams. "With other sifters we had screen breakage quite often, but have not had any with the centrifugal sifters."

A hinged door with safety interlock provides interior access for cleaning, inspection and screen changes.

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Canada Bread Atlantic Boosts Output, Cuts Flour Dust, with Centrifugal Sifters

Equipment	CENTRI-SIFTER In-Line Pressure Sifter
Application	Sifting White & Whole Wheat Flours
Features	Heavy-Duty Wedge Wire Screen; 14.7 PSIG Pressure Rating

Flour is screened at 30 mesh (600 micron) and 8 mesh (2360 micron) sizes for Canada Bread Atlantic's main products – white and whole wheat breads, and 'Smart Bread' multigrain bread based on white whole wheat flour.

The St. John's, Newfoundland, plant of **Canada Bread Atlantic**, one of Canada's largest producers of bread and other flour-based products, processes more than 30,000 tons (30,500 tonnes) of flour annually, requiring an efficient, low-maintenance system to sift the flour upstream of blending and baking operations.

Overcoming sifting capacity limitations

To meet increased demand for bread in Newfoundland due to population growth, the plant needed to overcome a bottleneck in flour screening, which was limited to 7,000 lb/h (3,100 kg/h) of capacity (the equivalent of 2.5 bulk bags) using two existing gyratory box screeners. To boost output the plant installed two pressurized CENTRI-SIFTER centrifugal sifters from Kason Corporation, which can process 10,000 lb/h (4,500 kg/h), a 43% increase.

Wilfred Verge, maintenance manager at the site, says, "Since the system is fully enclosed from bulk bag unloader, hopper and rotary valve, to sifter to silo, it prevents contamination of the product and plant environment while increasing capacity," adding, "The old box screeners were vented through a breather sock that allowed dust to escape."

Improving sifting efficiency

A bulk bag unloader discharges the contents of 2800 lb (1275 kg) bulk bags into a hopper that has a provision for manual dumping of minor ingredients.

The material is metered by rotary valve into a pneumatic conveying line, and is directed through a diverter valve into either of two model MO-PS-SS CENTRI-SIFTER centrifugal sifters. One is fitted with a 30 mesh (600 micron) screen for white flour and the other with an 8 mesh (2360 micron) screen for whole wheat and "smart flour," a white whole wheat flour used in Canada Bread's Smart Bread brand. Multi-grain bread is created from Smart Bread by adding the seeds and grains during mixing.

Flour entering the sifter's inlet is fed by a screw into a horizontally oriented cylindrical sifting chamber, where rotating helical paddles continuously propel material against the screen, accelerating the passage of on-size

One pressurized CENTRI-SIFTER centrifugal sifter is dedicated to screening of white flour, the other for screening of whole wheat flour.

Screened flour ready for blending with other ingredients.

particles through screen apertures. The paddles, which never contact the screen, also serve to break up soft agglomerates. Oversize particles are ejected through the downstream end of the screen cylinder, and exit through a discharge port.

Cleaning is faster

Labor required for cleaning the screener is cut by roughly 90 percent, owing to its stainless steel construction to USDA, FDA, BISSC, 3-A and other sanitary standards, and to the two-bearing cantilevered shaft design that allows quick removal of internal components.

The externally-mounted bearings are located between the screening chamber and motor drive, eliminating the need for a bearing on the hinged end plate, allowing the retainer plate, screen cylinder and paddle assembly to slide freely from the shaft end for cleaning, screen changes or inspection. Wide spacing between the bearings, a large diameter shaft and a flexible shaft coupling combine to prevent vibration at high speeds under heavy, imbalanced loads.

"The old gyratory box screeners required about 90 minutes to clean, but the new ones take only 10. We open the end plate, pull out the basket and paddles, blow them off, and replace them," notes Verge.

"The sifters can handle more than 10,000 lb/h (4,500 kg/h) and will meet our capacity for years to come," he says.

Quick cleaning: Operator opens end plate, removes basket, and cleans basket and sifter interior in 10 minutes.

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Flavorchem Uses Centrifugal Force to Double Powder Screening Capacity

Equipment	CENTRI-SIFTER Quick-Clean Centrifugal Sifter
Application	Sifting Flavor Powders
Features	Easy-Clean Sanitary Design

When **Flavorchem** needed to screen flavor powders at twice the previous rate, a centrifugal screener offered the solution.

Growing demand required Flavorchem to double production of its flavor powders by replacing an existing vibratory screener with a Kason CENTRI-SIFTER three-bearing centrifugal screener, boosting output from 100 lb/min (45 kg/min) to 250 lb/min (113 kg/min) while allowing faster wash downs.

A Kason Model MO Quick-Clean CENTRI-SIFTER was specified after extensive research and trial runs, explains David Russo, chief engineer at Flavorchem. “Based on laboratory tests with some basic powder flavors, our Kason representative at Air Process Systems & Conveyors Co., Inc. sized the sifter for the flow characteristics, bulk density, and flow rate we required,” he explains. “We then ran some of our most difficult products on a demonstration sifter.”

The Quick-Clean CENTRI-SIFTER screener gravity-discharges into 100-lb (45-kg) capacity fiber drums, and can be rolled to a cleaning station and other blenders.

The four basic carriers cornstarch, yellow corn flour, dextrose, and maltrin are combined with as many as 10 additional ingredients, both wet and dry, producing free-flowing and non-free-flowing blends having bulk densities of 28 to 50 lb/cu-ft (448 to 800 kg/cu-m).

A Quick-Clean CENTRI-SIFTER centrifugal screener fits the restricted space below an 80 cu-ft (2.2 cu-m) capacity blender, sifting flavor powders at high rates.

Centrifugal Force = High Flow Rate

Carrier materials are loaded into an 80 cu-ft (2.2 cu-m) capacity blender in 3000-lb (1359 kg) batches, after which liquid and dry ingredients are added.

Following a blending cycle the batch is gravity-fed into a centrifugal screener whose feed screw redirects the material into the unit’s horizontally oriented, cylindrical nylon screen. Here, rotating helical paddles, which never make contact with the screen, continuously accelerate the flow of on-size particles through apertures in the wall of the screen cylinder and serve to break up soft agglomerates. Over-sized particles and trash are propelled through the downstream end of the screen cylinder and ejected through a discharge spout.

The compact design of the screener allows it to be positioned in a restricted space between the blender and 40 in. (1.25 m) high fiber drums being filled with 100-lbs (45-kg) of the material.

Cantilevered shaft allows rapid access to internals

Frequent product changeovers necessitate a minimum of one wash down per shift, a task that incurs minimal downtime, owing to the screener’s three-bearing design. The shaft cantilevers on a bearing located between the motor end of the shaft and the material feed screw when the hinged end cover is open, allowing the

The Quick-Clean CENTRI-SIFTER screener gravity-discharges into 100-lb (45-kg) capacity fiber drums, and can be rolled to a cleaning station and other blenders.

paddle assembly and screen cylinder to be slid off of the shaft for cleaning or screen changes. During operation, the shaft rides on both shaft-end bearings, with no dependence on the inboard bearing for support.

"The three-bearing design affords smooth operation," adds Russo. "Bearings at both the motor end of the shaft and on the hinged cover at the discharge end provide extra strong support and eliminate vibration at high speeds and loads."

"Operators have cleaned the unit in as little as one hour," reports Russo. "That includes wet washing and blow drying all the assemblies and the machine's interior."

Configured on a caster-mounted frame, the screener can be rolled to a cleaning station, as well as to other blenders, eliminating the cost of multiple units.

To keep pace with continued growth, Flavorchem will triple plant capacity by adding a second three-bearing centrifugal sifter and a 6000-lb (2718-kg) capacity blender.

The circular vibratory screener that was displaced has been dedicated to a third blender, while an additional Kason vibratory screener will sift ingredients upstream of a fourth blender.

Flavorchem is a full service flavor company offering finished flavor products as well as R&D to confectionery, bakery, dairy, beverage, and other markets.

The three-bearing cantilevered shaft of the Quick Clean CENTRI-SIFTER screener enables the operator to open a hinged end cover and remove the screen cylinder and paddle assembly for rapid screen changes and cleaning during frequent product changeovers.

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Circular Fluid Bed Drying and Cooling Creates Efficiencies in Almond Pasteurization Process

Equipment	VIBRO-BED Fluid Bed Cooling/Drying System
Application	Pasteurizing Almonds
Features	High-Efficiency; Drying, Cooling & Pasteurizing

A Department of Agriculture (USDA) regulation introduced to eliminate rare cases of salmonella in raw almonds has prompted many California almond processors to install steam pasteurization equipment that achieves a four-log reduction of the bacteria (a 10,000-fold decrease). In most installations, the pasteurization equipment is oriented horizontally, but a top-10 (worldwide) almond producer here called **Hilltop Ranch** has taken a different, patent-pending approach in which almonds flow downward by gravity in a zig-zag pattern through a vertically oriented, 22 ft (6.7 m) pasteurization chamber. This enables steam to be utilized throughout the column more efficiently, reducing energy consumption, while treating all almond surfaces uniformly and reducing the equipment footprint by approximately 50 percent.

To further reduce energy consumption and floor space requirements, the company again broke with tradition and installed two circular, vibratory fluid bed processing systems, the first for drying, and the second for cooling, the pasteurized almonds.

Circular Vibratory Fluid Bed Processors Complement Vertical Pasteurization Process

"Although the original pasteurization process was designed to incorporate horizontal fluid bed processors, circular units from Kason caught our interest," recounts Charlie Jahn, Quality Manager for Hilltop. "We considered a few fluidized bed processors, and had some initial testing done with a conventional rectangular system. Most work well but they're twice as large, so they require extensive infrastructure and ancillary equipment, as well as energy-consuming levels of airflow," he says.

According to Jahn, a fluid bed processor had not previously been used for drying or cooling of almonds, so he specified the heat and moisture ranges required immediately after pasteurization, the cooling requirements after drying, the throughput requirement of 22,000 lbs/h (9,979 kg/h) of almonds, and other requirements. He then shipped raw almonds to the Kason laboratory in Millburn, NJ for both drying and cooling trials.

Almonds are conveyed from a holding tank (right) to a pasteurization tower (left of holding tank) from which they proceed to a fluid bed dryer (bottom) and then to a fluid bed cooler (top). Beneath the cooler is an equilibration tank where almonds achieve uniform temperature.

Dexter Long, Vice President, Operations at Hilltop explained, "We chose the Kason fluid beds based on test results for both drying and cooling, and because the company guaranteed those results if we could supply the minimum temperatures for drying and maximum temperatures for cooling operations. We like small footprints and vertical systems around here, so after the testing and one customer recommendation, we ordered the two circular vibratory fluid bed units. They were easy to install, easy to operate and clean, and they're working efficiently as guaranteed."

An 84 in. (2125 mm) diameter circular fluid bed dryer, clad with insulation blanket, dries almonds to moisture content between 4.5 and 5.5 percent. Throughput rate is 22,000 lb (9,979 kg/h) per hour.

The circular fluid bed processor offers a higher strength-to-weight ratio than rectangular units of equivalent capacity, according to David Long, founder of Hilltop Ranch, and does not require heavy steel sidewalls or cross braces to withstand extensive vibration. Inherent strength of the circular unit also allows materials of construction to be down-gauged and gyratory motors to be downsized. The unit's small, circular footprint was also desirable to the company, which opted for an 84 in. (2125 mm) diameter model, the largest currently offered.

Drying of pasteurized almonds

Immediately following steam pasteurization, the elevated moisture content of almonds must be returned to between 4.5 and 5.5 percent,

because at only 6.8 percent moisture, the almonds would become too soft and have a shorter shelf-life.

To remove excess moisture, almonds exiting the vertical pasteurization chamber are metered by a rotary airlock valve into the circular fluid bed dryer, model K-84/100. Imbalanced weight gyratory motors cause the almonds to vibrate on a perforated plate within a rising column of heated (180 °F [82°C] minimum) air blown into the center of the fluid bed chamber from below by a 25 hp (18.6 kw) variable speed fan. Continuous air flow and vibration separate and fluidize individual almonds, maximizing the rate at which drying occurs.

The vibratory motion also serves to convey the almonds in a controlled spiral pathway from the center to the periphery of the chamber on a first-in/first-out basis (dwell time approximately one minute) and to evacuate the chamber at the end of each cycle.

Cooling of dried almonds

Heated almonds exit through a discharge spout at the periphery of the fluid bed dryer and are elevated 35 ft (10.7 m) by a drag conveyor to a Kason circular vibratory fluid bed cooler which differs from the dryer in only one respect: instead of a thermal fluid heater with blower to introduce warm air, it is equipped with a heat exchanger (plumbed to a plant chiller) and blower to force cool (65°F [18.3°C] maximum) air into the center of the fluid bed chamber from below,

An 84 in. (2125 mm) diameter circular fluid bed cooler reduces the temperature of almonds with air cooled to 65ºF (18.3ºC) or less in one minute.

cooling the almonds to ambient temperature or less after a dwell time of approximately one minute.

Equilibrating of cooled almonds

To equalize the interior and exterior temperature variation of the almonds resulting from rapid cooling, they are gravity-fed into a vertical-cone equilibration tank in which ambient air is blown onto the almonds. The tank walls are inclined at 70 degrees to ensure that the almonds pass through on a first-in/first-out basis for uniform equilibrating.

"The equilibration step may be unique to Hilltop," says Jahn. "The almonds are mostly equilibrated after a minute in the Kason fluid bed cooler, but their interior temperature is marginally warmer than the exterior, so we added this 30-minute step. Our quality-control 'sweat-test' indicates that this step eliminates all residual moisture and condensation during packaging, a problem we know that other processors have experienced. The whole vertical pasteurization process takes a little over 30 minutes, with most of that time spent in the equilibration tank."

Hilltop a pioneer of innovative processing systems

Vertically configured systems are nothing new at Hilltop Ranch. Shortly after founding the company in 1980 with his wife, Christine, founder David Long leveraged his engineering background to build what Hilltoppers call "Mount Satake" their 65 ft (19.8 m) high almond initial sorting tower for separating almonds based on color and deformities. Long used the same vertical approach when he built a prototype almond pasteurizer in 2001, shortly after the industry's first salmonella incident, followed by the company's full-scale, 40 ft (12.2 m) high pasteurization tower engineered and manufactured in cooperation with Wilkey Sheet Metal in nearby Turlock, California.

After the industry's second salmonella incident in 2004, the Almond Board of California (ABC) together with the USDA, developed the new pasteurization mandate specifying the aforementioned four-log reduction minimum. Long was able to comply by merely increasing the amount of steam and heat and making other adjustments. Today Hilltop and Wilkey are partners in a pending patent for their refined vertical almond pasteurization system, which awaits validation testing for the

Almonds are hand sorted before entering the pasteurizer.

four-log minimum by National Food Laboratories and approval by the ABC review committee.

Yet another example of Hilltop innovation is its use of a thermal fluid heating system by Fulton that uses isolated hot oil to generate steam, send hot air to the fluid bed dryer, and preheat the pasteurizing chamber. According to Long, the system is not only safer and more efficient than conventional boilers, but does not require a permit or a licensed boiler operator. The system is also said to prevent condensation inside the equipment while minimizing both water and energy requirements throughout the pasteurization process.

"We're always looking for efficient solutions at Hilltop," he says. "Our custom-designed processes, which are often vertically oriented, conserve floor space while yielding all kinds of operational efficiencies that help reduce costs and provide safe, high quality almonds at a good price, at a rate of over 50 million lbs (22.7 million kg [22.7 metric tons]) per year."

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Food Granulizing Line Fits Restricted Space with Circular Fluid Bed Processor

Equipment	VIBRO-BED Compact Fluid Bed Granulizing/ Drying System
Application	Moisturizing, Agglomerating & Drying Dairy Powders
Features	Compact Turnkey System

Material before (left) and after being moisturized, agglomerated and dried in the circular fluid bed processor.

Precision Blending International's (PBI) business consisted entirely of blending and milling dairy powders for food and dairy products until 2010, when a customer asked the company to produce an agglomerated blend of finely powdered raw material to improve its processability in food formulations.

"Agglomeration was new for us, requiring a third process line," says Dan Carlbom, owner and president.

The opportunity meant more business for PBI, but also the challenge of fitting a new line that includes equipment to moisturize, agglomerate and dry the material, in a plant of 27,000 sq ft (2,508 sq m). The process line details of which Carlbom declines to disclose for competitive reasons involved a fixed length of machinery and therefore limited size options for the drying equipment at the end of the line.

Footprint influenced fluid bed processor selection

Carlbom decided that a fluid bed processing system would work most efficiently, and had two choices of equipment. One was a conventional rectangular fluid bed dryer, which would have taken up a large amount of space due to its shape, structural elements, and weight. The other was a circular fluid bed processing system, which he purchased from Kason Corp. The circular type not only dries the resized protein powders efficiently, but with a 60 in. (1524 mm) diameter, takes up far less floorspace than a rectangular fluid bed system. "The unit fit where I wanted to put it," Carlbom says.

Because the circular fluid bed processor is inherently more rigid that rectangular designs, materials of construction can be of downgauged, internal crossbraces eliminated, and gyratory motors downsized. Fewer weld seams and the absence of corners and internal cross braces also facilitate faster cleaning and changeover times.

The circular fluid bed processor can also be integrated with a heater, blower, ductwork, spray line, and control panel on a caster-mounted frame, allowing in-plant mobility and rapid setup.

Powder enters the circular fluid bed processor through the top port. From the bottom, hot air is continuously blown upward through an enclosed circular screen on which the particles separate and fluidize. At timed intervals, liquids are added to the air stream to moisturize and agglomerate the particles, while the hot air continues to dry the material.

The circular fluid bed processor consumes significantly less floor space than the rectangular fluid bed dryer originally considered.

Circular Fluid Bed Processor

At PBI, the circular fluid bed processor is configured to moisturize, agglomerate and then dry the powders.

Dairy proteins arrive at the plant in bulk bags that are discharged into the process through a grate that removes oversized agglomerates and foreign material.

Material enters the fluid bed processor through an intake port on top of the unit via an auger feeder and rotary valve. The heater, blower and ductwork route hot air upward through the enclosed circular screen on which the continuous air flow and vibration separate and fluidize individual particles, maximizing the surface area of material. The vibratory motion of the processor also serves to convey the material along a defined pathway for uniform processing on a "first in/first out" basis.

Liquids are added to the air stream at timed intervals to moisturize and agglomerate particles, and impart desired flow characteristics. "The powder starts out very fine, almost like talcum," Carlbom says. As it moves through the process, particle sizes increase, improving flow, and solubility.

The hot air then dries the material to a preset moisture level. Once dry, the granules exit through the discharge port onto a conveyor, which transfers them to a packaging line for loading into 15 or 20 kg (33 or 44 lb) bags.

The process is continuous, although throughput varies by product. PBI has setpoints for different types of powder, and process rates vary from 500 to 2,000 lb (1,100 to 4,400 kg) per hour. PBI purchased the fluid bed processing system from ABM Equipment Company Inc. of Portland, OR, a Kason representative. Carlbom says, "Kason provided PBI with a laboratory unit for onsite testing, which confirmed our decision to order the larger unit for full scale production."

Carlbom says the unit works reliably, and meets a demanding production schedule of 12 hours per day, 5 to 6 days per week.

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CROSS-FLO Dewatering Sieve and VIBROSCREEN Help Cider Producer Clean Up

Equipment	CROSS-FLO Static Dewatering Sieve
Application	Screening Apple Cider Wastewater
Features	Heavy Duty Wedge Wire Screen; Adjustable Angle Dewatering

"We make sure our apples are spotless before we make them into cider," explained Dan Zeigler, principal of **M.H. Zeigler & Sons Inc.**, Lansdale, PA.

Leaves, twigs and other debris arrive at Zeigler's cider production facility along with apples from neighboring and distant orchards.

"We carefully spray wash, brush and rinse the apples. This apple cleaning operation results in significant amounts of wastewater that requires separation of solids from water," according to Mr. Zeigler.

For years, Zeigler relied on motorized shaker screens to remove solids from wastewater. Their use proved troublesome because sometimes twigs would bridge across the discharge spout and then the process would slow tremendously. The offending twigs or other debris had to be removed to let the wastewater discharge.

After watching a dewatering sieve clean plastic pellets, Mr. Zeigler installed three of these Kason CROSS-FLO Motorless Sieves in his own plant. But unlike most sieves, which are free-standing and utilize valuable floor space, these Kason stainless steel units are suspended from the ceiling. Kason frequently modifies its products to meet unusual requirements.

The two 36 in. wide units have screens with 0.03 inch (.762 mm) openings and the 18 in. wide unit has .020 in. (.508 mm) openings. Each sieve handles from 30 to 60 gpm (110 liters/min. to 220 liters/min.) of wastewater 24 hours per day from September through December.

Since installation six years ago, these Kason sieves have operated with very little maintenance. The headboxes are checked periodically and cleaned if needed. There are no motors to worry about as there are with the shaker screens.

After passing through the screens, the water flows to the sewer and is cleaned further by the public water authority. Leaves, twigs and any other debris are hauled out by trailer along with apple pulp and they are disposed of according.to environmental regulations.

Instead of a free standing Cross-Flo sieve such as this one, M.H. Zeigler & Son uses one suspended from the ceiling.

The Kason CROSS-FLO units have an extended acceleration/orientation ramp at the upper portion of the unit that performs three functions. First, the elongated ramp develops the proper feed velocity to the profile wire deck, enhancing the "Coanda" effect and the dewatering capacity. Second, when handling fibrous material, it aligns the fibers in the direction of the flow before they reach the transverse slotted openings of the deck. This orientation of the fibers permits wider spacing to be used between the profile wires, as the length rather than the diameter of the fibers becomes the crucial sizing dimension. The wider spacing increases the open area and the capacity of the sieve deck.

Zeigler also uses a Kason VIBROSCREEN Circular Screen Separator to remove oversize particles and a portion of the sediment from the cider after it is has passed through filter bags. A 60 in. (1530 mm) diameter unit meets current capacity demands and acts as a final quality control device.

After being diced, apples are squeezed in a cider press. The cider drains through filter bags and down onto pans and then to the stainless steel circular screen separator which is equipped with a fine mesh screen. After screening, the cider is chilled, packaged and crated for shipping to regional grocery stores. The 65-year-old company employs about 35 people to process apple cider, apple juice and lemonade.

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Produce Distributor Removes Solids from Wastewater with Static Dewatering Sieve

Equipment	CROSS-FLO Static Dewatering Sieve
Application	Screening Fruit & Vegetable Processing Wastewater
Features	Heavy Duty Wedge Wire Screen; Spray Wash CIP

The Class Produce Group sells fresh-cut produce prepared by its subsidiary **TGD Cuts** to stores, restaurants, the military, schools and other foodservice customers. The firm distributes throughout the eastern half of the U.S., from Maine to Florida and west to the Mississippi River.

Requisite washing of these fruits and vegetables generates an average of 28,000 gal (105,980 l) per day of wastewater containing total suspended solids (TSS), which were causing problems for the company and the municipality.

Produce debris has to be filtered

Peelings, seeds and debris comprising the bulk of the TSS, clogged pumping systems at the TGD facility and burdened the filtration systems at the Howard County, MD municipal wastewater treatment plant, requiring a solution.

"Howard County has a 20-plus year old infrastructure that is trying to keep up with growth," says Vic Sainato, lead refrigeration technician at TGD Cuts. "They told us we had to reduce the solids being piped to the treatment plant."

To solve the problem, TGD installed a CROSS-FLO Dewatering Sieve that continuously removes solids via an inclined screening deck fitted with a stainless steel profile wire screen.

Slots in the screen are oriented perpendicular to the direction of wastewater flow, which accelerates the flow rate of water through the screen in accordance with the "Coanda effect," a principle of physics in which fluid remains in contact with a convex surface, increasing its rate of passage through the screen.

Manufactured by Kason Corporation, the sieve is a single-deck model measuring 48 in. (1219 mm) in width and 54 in. (1372 mm) in length. The incline of the screen deck can be field

CROSS-FLO Sieve removes solids from 28,000 gal (106,000 l) per day of TGD Cuts' wastewater before it enters the municipal wastewater system.

adjusted to optimize performance.

Important to TGD Cuts is that no motor or labor is required. "The liquid merely flows over and through the profile wire screen, as solids fall naturally from the screen into the hopper," says Sainato.

Wastewater flows over an inclined screening deck that captures peelings, stems, foreign objects and debris as small as seeds.

Plant pumps waste water without TSS

TGD's plant is situated some 20 ft (6 m) downhill from the wastewater main that leads to the municipal treatment facility. Before introducing the CROSS-FLO Sieve, the pumps were pushing the TSS-laden wastewater upward, often becoming clogged in the process. Shutting down to clear the pumps cost up to $10,000 per incident in materials, lost time, and labor costs.

The elevation meant TGD had to construct a raised system (20 ft [6 m] high) within the plant for the CROSS-FLO Sieve, requiring permitting from the municipality. "The system involved piping, tanks, and plumbing to and from the sieve to the water treatment plant," says Sainato. "We had to prove to the county that this would work."

Wastewater is pumped onto the dewatering sieve which separates solids at high rates without the use of power.

Screened wastewater is pumped to the municipal wastewater plant in compliance with accepted levels of total suspended solids.

Installation a win for processor, municipality, and local farmer

The system was constructed in two months, and put into operation in May 2018. Howard County is in the busy Baltimore-Washington DC corridor where growth is straining its aging infrastructure. The county's 2017 estimated population of 321,000 is up 30% from 2000. Businesses and residents are asked to reduce their TSS output. The county's website, LiveGreenHoward.com, urges residents to compost their vegetable waste instead of sending foods through garbage disposals.

A county representative helped Sainato identify the dewatering sieve by way of a colleague who faced a similar problem at neighboring industrial plant. "I hauled 10 five gallon pails of our wastewater in a pickup truck to the Kason laboratory in New Jersey," says Sainato. "We could see it worked right away."

In addition to easing the burden on Howard County's WTP, removing total suspended solids from the waste stream produces a steady supply of hog feed which is picked-up daily by a local farmer.

TGD Cuts' organic waste is utilized by a local farmer as animal feed.

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Expanded product line produced worldwide, solves an unequalled range of processing problems globally.

The combined capabilities of Kason Corporation and Kason Europe Ltd lines of centrifugal sifters make Kason the world-leading producer in both size and scope, offering lab units up to the world's largest sifters with capacities to 100 tons (90 tonnes) per hour.

The expanded centrifugal sifter line is complemented by Kason's equally extensive line of round vibratory screeners, which encompasses the world's widest range of designs and sizes, from 18 inch (46 cm) diameter laboratory units up to 100 inch (254 cm) diameter screeners with capacities to 150 tons (136 tonnes) per hour, and by Kason's ultrahigh capacity static sieves. Rounding out the screener line are Kason's vertical in-line sifter models for check-screening several pounds/kilos per hour to production screening of up to 50 tons (45 tonnes) per hour.

This extensive line of screening equipment fits neatly with other Kason equipment in terms of upstream and downstream positioning in the process stream.

One example is Kason's complete line of circular, vibratory fluid bed dryers, coolers and moisturizers—innovative, self-contained systems that offer greater operational efficiency and lower capital cost than rectangular designs. Other examples include Kason's size reduction equipment such as air classier mills, cone mills, universal mills and lump breakers, and our mixing/blending equipment models including double cone blenders, vertical mixers and horizontal mixers, as well as engineered process systems.

This expanded range of high performance equipment is available to food, pharmaceutical, nutraceutical, dairy and industrial standards worldwide, and is now manufactured in four strategic locations for rapid shipment, cost competitiveness and factory support throughout the world.

USA:
KASON CORPORATION
67-71 East Willow Street
Millburn, NJ 07041-1416
Tel: (973) 467-8140
US: (844) KASON-4-U
Fax: (973) 258-9533
info@kason.com

EUROPE:
KASON EUROPE LTD
Stoke-on-Trent Office
Park Hall Business Village
Park Hall Road
Stoke-on-Trent, Staffordshire
ST3 5XA
Tel: +44 (0) 1782 597 540
Fax: +44 (0) 1782 597 549
sales@kasoneurope.co.uk

EUROPE:
KASON EUROPE LTD
Macclesfield Office
Springwood Way
Macclesfield, Cheshire
SK10 2ND
Tel: +44 (0) 1625 665 999
Fax: +44 (0) 1625 665 998
sales@kasoneurope.com

CANADA:
SEPARATOR ENGINEERING LTD
4119 Cousens Street
Saint Laurent, Quebec H4S 1V6
Tel: (514) 667-6777
Fax: (514) 745-2074
info@separatorengineering.com

kason.com

Air Process Systems & Conveyors Co., Inc.®
Manufacturers' Representative

Air Process Systems® (APSCO)
774 Burr Oak Drive
Westmont, IL 60559
Tel: (630) 887-0700
US: (800) 822-0771
sales@AirProcessSystems.com

cGMP