

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

# ScreenTips

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## Cryogenic Preprocessing and Centrifugal Screening Create Super-fine Rubber Powders That Spawn New Applications and Dramatic Energy Savings

TUCKER, GA—Lehigh Technologies combines a patented cryogenic preprocessing technique and a Kason centrifugal screener to turn recycled tire granules into the finest rubber powders on the market. The company's fine, 80 to 140 mesh (177 to 104 microns) and super fine powders, 140 mesh (104 microns) and above, are opening new applications in sealants and coatings, and expanding rubber powder consumption in new tires and recaps.

Recycled rubber particles have long been used as fillers and performance enhancers for more costly elastomers. Approximately one billion pounds will ship this year for use in carpet underlay, flooring material, belts, hoses, engine mounts and dampers, wire, cable, paints and adhesives. While the market has been growing at a robust 25% per year, even greater growth is predicted.

"As we make powders finer, the market for them becomes almost unlimited," notes Bill Meckert, Lehigh's Vice President of Engineering.

A number of manufacturers ship rubber powders 40 mesh (420 microns) and larger, and a few produce up to 100 mesh (149 microns), but no one matches Lehigh's 240 mesh (60 microns) rubber powder. Ultra fine powders in the 200 to 240 mesh (74 to 60 microns) range are essential for applications such as sealants and automobile undercoatings. These materials are applied with fine orifice nozzles that would clog if larger particles were used.

The smaller the particle size, the more rubber powder can be added to tires and recaps. Finer particles present a larger surface area for bonding and, therefore, lower the risk of delamination. Since recycled rubber powder costs about half the price of virgin material,



*Rotating paddles inside the Kason CENTRI-SIFTER® chamber simultaneously mix flow aid with the finely ground rubber, break up soft agglomerates, accelerate properly sized particles through the screen, and scalp fiber and steel debris.*

the higher the powder content the greater the cost benefits. One pound of recycled rubber added to a tire saves almost 1 gal (3.79 liters) of crude oil, the amount required to produce an equal amount of virgin rubber.

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## New Centrifugal Screener Cantilevers for Quick Cleaning

MILLBURN, NJ—A new medium capacity CENTRI-SIFTER® centrifugal screener model "MO" from Kason Corporation features a cantilevered shaft with two, externally-mounted bearings between the screening chamber and motor drive, eliminating the need for a third bearing on the hinged overs end plate. The design allows all internals 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, even at high speeds under heavy, imbalanced loads.

The new screener is intended for food, dairy, and pharmaceutical applications requiring thorough washdown, as well

as other applications involving frequent screen changes/inspections or runs of multiple materials where cross-contamination is of concern. It is available with compliance to USDA, FDA, BISSC, 3-A, and other US and European sanitary standards, with Nylon monofilament, woven wire, or wedgewire screen cylinders. Configurations are offered for continuous operation in-line with dilute-phase pneumatic conveying systems, as well as gravity-fed applications.

Opening a hinged door at the discharge end of the screening chamber allows a retainer plate, screen cylinder, and helical paddle/feed screw assembly to be removed in one minute.



Dry or moist bulk solid material is gravity-fed into the feed inlet and redirected into the cylindrical sifting chamber by means of a feed screw. Rotating helical paddles within the chamber continuously propel the material against the screen, while the resultant, centrifugal force on the particles accelerates them through the apertures. In addition to sifting and scalping of dry bulk materials, the screener can break up soft agglomerates. Oversized particles and trash are ejected through the end of the screen cylinder into a discharge spout.



# Caravan Ingredients Ups Capacity, Quality With Bag Dump Screening Station

KANSAS CITY, KS—Caravan Ingredients, a leading manufacturer of food emulsifiers and the largest U.S. supplier of functional ingredients to the wholesale baking industry, built a new bag dump station equipped with a low-profile vibratory screener to boost capacity and product quality.



Caravan Ingredients built this bag dump station, which incorporates a stainless steel platform table, a 60 in. (1524 mm) diameter low-profile vibratory screener from Kason, and a dust collection system.

At the company's Kansas City plant, one operator was responsible for slicing and dumping bags of flour, sugar and other raw ingredients into a 3x5 ft (91x152 cm) rectangular screen bag dump station, a process that generated dust, accumulated material on internal edges of the station, incurred downtime for maintenance, and occasionally allowed bag scraps to enter the batch. Access to the dumping area was only large enough for one operator, limiting the output of the entire process.

## New Bag Dump Station Accommodates Two Operators, Screens Foreign Matter

Caravan Ingredients overcame these limitations by fabricating a 304 stainless steel platform table, 80 in. (2032 mm) wide, 68 in. (1727 mm) long and 32 in. (813 mm) high, that

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***At half the height of a conventional vibratory screener, the low-profile screener, reduced the height to which bags must be lifted by operators, significantly reducing fatigue.***

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allows two operators to simultaneously empty bags into a 60 in. (1524 mm) diameter low-profile vibratory screener from Kason Corporation. The waist-high table permits enough room for two operators to slice open and empty bags into the screener, doubling capacity. On-size particles pass through the screen at high rates in a vertical straight-through pathway, gravity discharging through the screener outlet into mixers on the floor below.

Product quality improves as the screener separates on-size powders from lumps and paper scraps from cut bags.

Dust collection devices integral to the stainless steel table create a clean work environment during bag dumping. A center-hinged lid remains open as bags are dumped, then shuts while the screener completes its cycle. Caravan Ingredients also designed its own dust collection system located at the rear of the unit to collect airborne dust. The round design of the vibratory screener obviated the flanges and corners of the previous bag dump station that accumulated material, reducing maintenance.

At half the height of a conventional vibratory screener, the low-profile screener reduced the height to which bags must be lifted by operators, significantly reducing fatigue. Unlike conventional screeners having one imbalanced-weight gyratory motor located beneath the screening chamber, the FLO-THRU™ VIBROSCREEN® unit has two imbalanced-weight gyratory motors, mounted externally on opposite

sides of the screening chamber, significantly reducing the profile of the screener, and the minimum height of the bag dump table.

The screener imparts multi-plane, inertial vibration that causes particles to pass through apertures in the screen. To prevent screen blinding,

a 2 in. (51 mm) high ball tray anti-blinding device utilizes the screener's vibratory action to bounce elastomeric balls between the upper "working screen" and a lower "ball screen," effectively dislodging particles from apertures in the upper screen.

Bag scraps and other oversize particles prevented from entering the material stream are vacuumed from the screening chamber between production runs.

Caravan Ingredients built seven such bag dump tables, the first in 1998. Michelle Schlie, Project Manager, says the bag dump tables have become an integral part of the company's Total Productive Maintenance philosophy with a "cleaner, safer and reduced maintenance environment."



Waist-high table, 80 in. (2032 mm) wide and 68 in. (1727 mm) long, accommodates two operators simultaneously opening and emptying bags.

## Screener-Fluid Bed Dryer System

MILLBURN, NJ—A new self-contained Circular Vibratory Screener-Fluid Bed Dryer System from Kason Corporation removes oversize and undersize material, and dries on-size material.

The pre-packaged system scalps and de-dusts 2500 to 3000 lb (1134 to 1361 kg) of bulk material per hour

of a rectangular fluid bed dryer of equivalent capacity and allows consolidation of all primary system components. 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. Cleaning time is cut by more than 50% due to the reduction in interior seams and accessibility afforded by a quick-disconnect housing.



V-0962

*This double-deck, 30 in. (762 mm) diameter circular vibratory screener removes oversize particles through the upper spout and undersize particles through the lower spout. On-size material descends from the center extended spout into the fluid bed dryer.*

*This turnkey screener-dryer system from Kason scalps, de-dusts, and dries up to 3000 lbs (1361 kg) of bulk material per hour.*



using a double-deck, 30 in. (762 mm) diameter circular vibratory screener, and then dries the material in a 40 in. (1016 mm) diameter circular vibratory fluid bed processing system.

The screener is equipped with an imbalanced-weight gyrotory motor that vibrates the screening chamber which is suspended on springs. Oversize particles travel in controlled spiral pathways from the center of the upper screen to a spout at the screen's periphery where they are discharged for reprocessing. On-size particles falling onto the lower screen travel in controlled spiral pathways to an extended spout at the screen's periphery that leads to the fluid bed dryer. Undersize material passes through the lower screen onto an integral metal chute and through a third spout for reprocessing.

The circular fluid bed dryer is roughly half the size and weight

## Suspension-Mount, Low-Profile Sanitary Screener Achieves High Rates

MILLBURN, NJ—A new Low-Profile, Sanitary Screener from Kason Corporation employs two unbalanced-weight gyrotory motors mounted on opposing exterior sidewalls of the unit, instead of one motor positioned beneath the screening chamber, reducing minimum height requirements significantly. Mounted on suspension brackets, the design also allows vertical alignment of the top inlet and bottom outlet, allowing on-size material to descend through the screen in a straight-through path at high rates into mobile vessels on the plant floor. Oversize material is ejected through a spout at the periphery of the screen.

Called a VIBROSCREEN® FLO-THRU™ model K24-1FT-SS, the 24 in. (610 mm) diameter screener is constructed of stainless steel finished to 3-A, FDA, BISSC, and other sanitary standards.

Loosening the quick disconnect clamp ring assembly that connects the top and bottom frame sections allows the screen to be readily changed, or the screener to be disassembled rapidly for thorough wash down.



V-0477

The units are designed with an optional suspension-mount feature. The unit is equipped with a Ball Screen anti-blinding device consisting of elastomeric balls held captive between the upper operating screen and a coarse, lower ball screen. The vibratory action of the screener causes the balls to bounce against the underside of the operating screen and dislodge near-size material lodged in screen apertures.

Other FLO-THRU Low-Profile Screeners currently available range in diameter from 18 to 84 in. (460 mm to 2135 mm).

*Cryogenic cont. from page 1*

Lehigh's manufacturing site in Tucker, GA, is one of the largest and most advanced rubber powder manufacturing facilities in the world. Here proprietary technology is combined with commercially available industrial equipment to produce consistently sized rubber particles, 40 mesh (420 microns) and smaller that are sold under Lehigh's Polydyne™ label.

microns) are ground down before the sized material is stored in bins.

Upon demand, stock is drawn from the bins and fed by insulated screw conveyor into the liquid-nitrogen-cooled cryogenic chamber where temperature, typically between -100°F to -130°F (-73°C to -90°C), is regulated based on the particle size desired. Freezing turns the rubber granules into a glass-like state that fractures easily during grinding in a high-speed attrition mill. After size-reduction, the material passes through a rotary drum magnet to remove steel belting freed during the grinding process.

At this stage, the powder exhibits an oily texture and is electrostatically charged, causing the particles to agglomerate and making them difficult to screen. A flow aid, such as finely ground talc or fumed silica, is metered in and the mixture screwed into a Kason Model MO-CS CENTRI-SIFTER®, centrifugal screener that blends the two, causing the rubber particles to separate.

Inside the screener's horizontally-oriented cylindrical chamber, rotating helical paddles break up soft agglomerates and continuously propel the material against a 20 to 30 mesh (840 to 589 microns) woven nylon monofilament screen. The centrifugal force accelerates the on-size particles through the apertures and scalps any fiber from the tire cord. The fibers ball up like cotton and are discharged through the open end of the screen cylinder along with any oversized rubber and residual steel.

"The CENTRI-SIFTER screener, which we purchased through Cino Equipment Co., Berkeley Heights, NJ, does everything simultaneously, which is why we use this equipment," says Meckert.

The CENTRI-SIFTER centrifugal screener's ability to work efficiently within the demanding production environment contributes to the quality of powder processed on the line. Its heavy-duty construction



*Delivered in bulk bags or truckloads, 100% recycled, granulated rubber is obtained from tire processors in sizes from 0.75 in. (19.05 mm) down to 10 mesh (2000 microns).*

makes it well suited for continuous inline operations. The unit is compact and operates quietly with vibration-free action. A large access door facilitates cleaning, and screens can be changed in under two minutes.

Following the CENTRI-SIFTER screener, the powder is discharged into a proprietary tumbler screening process that classifies it. The line produces 2500 lbs/h (1134 kg/h) of powder in sizes ranging from 40 to 240 mesh (420 to 60 microns), depending on the application. Currently, products are shipped only within the USA, but at the request of Lehigh's globally diverse customer base, the company will be shipping internationally.

"Our growing production will ensure a good supply of powder for our customers and enable them to lower their production costs by increasing the amount of recycled material in their products," remarks Meckert.

In the future, Lehigh foresees blending rubber with plastics to increase durability and flexibility, as well as to improve UV resistance so they are less susceptible to brittleness and cracking from sunlight. This application, which is still in the embryonic stage, will require even finer rubber powders than are now being produced. According to Meckert, the company's centrifugal screener will adapt to the new requirements with a simple change of screens.

*The centrifugal screener simultaneously mixes a flow aid with finely ground rubber, breaks up soft agglomerates, accelerates properly sized particles through the screen, and scalps fiber and steel debris.*



The raw stock is 100% recycle content, granulated rubber obtained from tire processors in sizes ranging from 0.75 in. (19.05 mm) down to 10 mesh (2000 microns). Delivered in bulk bags or truckloads, the material is dumped into a hopper and shaker-screened to classify the granules into sizes between 6 mesh (3360 microns) and 14 mesh (1410 microns). Granules exceeding 6 mesh (3360



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