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The "Standard Production Plant" (SPP) is a multi-purpose mixing and dispersing batching system designed to emulsify, homogenize or blend virtually any material. The vessel, recirculation piping, valves, controls and dual in-line mixing unit are included. Design of the SPP eliminates the need for additional equipment such as circulating and transfer pumps. Two components in the system — an integral agitator and high-shear mixing unit — combine to provide the most complete mixing, with the option to add powders without the need of vacuum. The SPP construction is limited to features necessary for the process as it relates to mixing results. **For more information on Mixing & Size Reduction, go to page 8.**



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Featured Article



Biosphere Industries, a manufacturer of biodegradable packaging and biodegradable bakeware, needed a highly accurate ingredient batching system to help meet its sustainability goals. The company interviewed several candidate vendors and, on the basis of speed, repeatability, lead time for completion and cost, selected a turnkey automated batching system. **To read about this success story, turn to page 20.**

Next Generation Slurry Pump

The new Goulds XHD Extra Heavy Duty World-Class Lined Slurry Pump can handle the heaviest slurry under the toughest conditions, according to the manufacturer. The new pump is designed to be maintained even while running, and to require less downtime for service procedures — with parts that are more accessible and adjustable than in other slurry pumps. **For more information on Pumps & Seals, go to page 14.**

ITT Goulds
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Featured Columnist



Try as we might, instead of improving communication, contemporary society still seems compelled to make it more difficult. The use of buzz words, acronyms and other letter abbreviations is increasing at a dramatic pace. Frequently, the creation of a new series of acronyms or other letter-type abbreviations is simply an attempt to make a concept appear substantially different from previously known data, when in fact, it's the same old stuff with a different name. Pump expert Ross Mackay discusses effective communication in this exclusive guest column. **To read the column, turn to page 18.**

Rotary Feeder for Bulk Material Handling

The MD Series of rotary feeder valves from ACS Valves immediately contributes tangible operating efficiency advantages and long-term production and maintenance savings. It is constructed with an 8-vane rotary valve that ensures proper pressure sealing at the inlet and outlet flange. The optimal seal produced by an MD Series rotary feeder can reduce compressed air loss by up to 28 CFM/year, according to the manufacturer. **For more information on Powder & Bulk Solids, turn to page 38.**



ACS Valves
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Work Light Strip

The WLS28 delivers a versatile lighting solution, featuring a robust, yet small profile, metal housing and is available in various lengths from 145mm to 1130mm, while maintaining the same narrow width of 28mm for all models. Extremely bright LEDs emit an even pattern of light, casting no shadows. The WLS28 also provides significant cost- and time-saving attributes in the form of energy efficiency and installation simplicity. **For more information about Plant Maintenance & Safety, go to page 32.**



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The Importance of Thorough Mixing

Glass Blended Rapidly with Abrasion-Resistant Rotary Mixer

While most reading this article may be unfamiliar with the Kopp Glass name, most are likely familiar with Kopp Glass products. From a humble beginning more than 80 years ago as a manufacturer of red glass for railroad signals, Kopp now claims to be the world's leading producer of

precision molded industrial quality technical glass.

The company is known worldwide among the industries it serves as a producer of molded borosilicate glass, a tough material that can withstand harsh industrial environments and is resistant to degradation from sunlight and weathering. The company offers more than 300 standard glass compositions, plus custom formulations, in any desired shade of color.

The glass is used worldwide in such diverse applications as airport and aircraft lighting, chemical process equipment, medical device illumination, light filters of all types (including military night vision equipment), electrical transformers, architectural and theatrical lighting — and railroad and traffic signals. Kopp glass can even be found at the South Pole, where scientists have installed a computerized network of thousands of 14-inch-diameter (35.5 cm) glass globes about a mile below the surface of the ice. The globes contain sensors, with the goal of capturing sub-atomic particles, called neutrinos.

Kopp produces its glass in small batches, typically in the range of 100 to 1,000 pieces, says David Pungratz, the company's mix and melt manager. The



The flange of a discharge valve at the hopper's outlet is positioned atop the inlet of the mixer using an overhead hoist and trolley, due to ceiling height restrictions.

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powdered ingredients are mixed, melted in a pot furnace, then molded by skilled craftsmen. "All our products are made by hand," he says.

The Importance of Thorough Mixing

The mixer is a vital part of Kopp's operation. "A batch may contain anywhere from five to 15 ingredients that must be mixed thoroughly in order to guarantee product quality," says Pungratz.

Kopp uses a rotary mixer made by Munson Machinery Co., Inc. of Utica, N.Y. It replaced a rotary pan mixer that had been in the plant for many years. The rotary mixer is a horizontal, rotating drum that is supported on either end by trunnion rings and driven by rollers, powered by a 5 hp (3.7 kW) motor. It has a stationary inlet at one end and a stationary outlet, with a discharge gate, at the other end. Mixing flights or baffles tumble the batch in a multi-directional manner.



Access doors facilitate interior inspection, cleaning and maintenance.

While many ingredients are used in Kopp's products, sand accounts for 60 to 75 percent of a formulation, so sand is delivered to a silo in tanker trucks of 40,000 lb (18,144 kg) capacity. The rest of the ingredients, including borax, metal oxides and various other minerals, arrive in bags, drums or barrels.

The ingredients for a batch are loaded into a large rectangular hopper that is set on load cells. Sand from the silo is fed to the hopper by means of a screw conveyor and a chute. When the amount of sand reaches the preset weight, an



The batch is rapidly discharged from the mixer into a cart that transports it to the furnace.

operator manually shuts off the conveyor. Other major ingredients are added manually, one by one. Finally, the minor ingredients, which are pre-weighed, are introduced into the batch.

When the batch is complete, the hopper is raised into position above the mixer's inlet by an overhead hoist and trolley. The flange of a discharge valve at the bottom of the hopper rests on a rubber seal affixed to the mixer's inlet, after which the valve is opened and material flows into the machine, aided by two vibrators located on the exterior of the hopper.

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36 Powder & Bulk Solids

Mixing is Rapid

The mixer (model GB10 glass batcher) has a capacity of 10 cu ft (2.8 cu m), or 1,500 lb (680 kg) for glass. However, Kopp's operation is limited to 700 lb (317 kg) by the size of the hopper. Pungratz explains that larger hoppers cannot be used because of the limited clearance above the mixer.

The liner and other contact surfaces in the glass batcher are made of abrasion resistant steel, designed to withstand the abrasive mixture of ingredients, particularly sand, in Kopp's formulations. Mixing times are

"We just have to grease a couple of fittings about every two weeks, and in the six years we've owned the machine we have not seen any wear on the liner and have had to replace only one seal."

only about five minutes — less than half the time required by the pan mixer, says Pungratz. Nevertheless, the machine's slow tumbling action, aided by the baffles, makes for "a homogeneous mix. We make the best hand-pressed glass in the world, with minimal defects," he asserts, "so our standards are very high."



Kopp replaced a rotary pan mixer with a Munson rotary batch mixer — a horizontal, rotating drum with a stationary inlet at one end and a stationary outlet at the other. Mixing flights, or baffles, tumble the batch in a multi-directional manner.

Once a batch has been mixed it is discharged into a wheeled cart or wagon and taken to a furnace. Kopp has two furnaces, one of which can accommodate 16 melting pots and the other 12 pots. Most of the pots have a glass capacity of 2,500 lb (1,134 kg). The furnace operates at 2,600 F (1,427 C), but the temperature of each pot can be individually controlled and ranges from 2,000–2,500 F (1,093–1,370 C), depending on the composition of the glass.

A Matter of Individual Skill

When a batch of glass is ready for use the pot is opened and cooled to a working temperature, then the glass is cast in molds of stainless steel or cast iron. This operation is carried out by two skilled craftsmen, whose respective job titles are glass gatherer and presser.

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The gatherer accumulates the appropriate amount of glass needed for the piece, using a punty — a steel rod that has a clay ball on one end. The punty is placed into the mouth of the pot until it touches the molten glass, then the punty is turned in a way that gathers glass on the clay ball. The glass is carried to and released into the mold and the presser shears off the flow, then pulls a lever to bring the plunger (the mold's male part) into the mold.

Pungratz notes that the glass gatherer and the presser use their experience to calculate the exact amount of glass needed for a piece. Large products, such as 24 inch-diameter (61 cm dia) Fresnel lenses, are made by layering three molten gobbs of glass.

Meanwhile, the mixer provides a continual supply of mixed glass ingredients to the furnaces. As soon as one batch has been discharged, the machine is cleaned and readied for the next batch. The machine processes 10 to 20 batches per day, typically of several different colors, so it is important to avoid residue from one batch that might contaminate the next one.

However, contamination has not been a problem with the glass batcher, says Pungratz. Essentially all the material is rapidly discharged, leaving minimal residue, he says, and cleaning takes only about 10 minutes, using a dedicated vacuum. A door on the side of the machine provides full access to the interior.

A second vacuum system removes any airborne dust that results from the cleaning operation. However, in contrast with the pan mixer, the rotary mixer generates very little dust, says Pungratz, and "this was a big selling factor for us." He adds that the rotary machine is "extremely quiet, while the pan mixer was very noisy."

Another big advantage is that the mixer is essentially maintenance-free, he says. "We just

have to grease a couple of fittings about every two weeks, and in the six years we've owned the machine we have not seen any wear on the liner and have had to replace only one seal."

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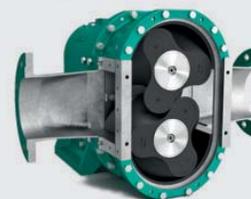
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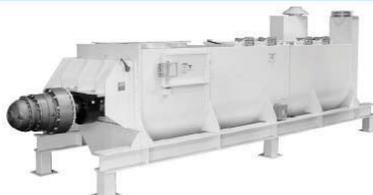
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