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MIXING AND BLENDING

New installation

Rotary batch mixer resolves color inconsistency problems for a decorative concrete products company

Customer complaints about unpredictable color variations and less-than-adequate material performance led a concrete products company to make a major change.

Wildly fluctuating hues and colors might be a good thing in fashion circles but not when mixing dry bulk materials for decorative concrete and masonry products. Uniform distribution of iron oxide pigments and specialty additives like plasticizers and polymers throughout the mix is key for consistent appearance and performance.

Yet, Throop, Penn.-based Concrete Texturing Tool & Supply (CTTS) was finding that its decorative concrete products, such as color hardeners, were becoming more and more inconsistent. The company had been purchasing the products from a California-based manufacturer and supplying them wholesale to professional installers and other customers since 1994. When the manufacturer's ownership changed hands, product quality began to deteriorate.

"We were in a situation beyond our control, with colors fluctuating dramatically," says Bart Sacco, owner of CTTS. "Formula changes in products like hardeners affected their workability and uniformity from lot to lot. It was awful. Color was all over the place."

In response, Sacco decided to take the situation into his own hands. He formed Kingdom Products to manufacture specialty cement-based dry goods that CTTS — and potentially other distributors — would sell. "We constructed a state-of-the-art blending facility that allows us to create color hardeners and other decorative concrete products, free of color drifts from batch to batch," he says.

Establishing the business

Key to Kingdom's operation is its mixing capability, Sacco says, and equipment selection was something he took very seriously. "When I was building the facility, I knew the main thing, the heart, of what I was going to need was the blender," he says. "I was

A forklift operator gets ready to load a container of ingredients into Kingdom Products' rotary batch mixer for processing, while a pallet of finished product is readied for distribution.

going to need something robust that could handle the amount of product I planned on running through it."

Supplier location was another factor in the decision. "We've specified that everything in our blending operation is manufactured in the USA," Sacco says. "That was another one of my requirements in choosing our manufacturing equipment." Having the supplier relatively close also helps with parts and service if they become necessary, he says.

Sacco investigated different mixer types and options on the market. He also sought recommendations from a wide network of contacts he'd developed after years of working in the industry. Eventually, he turned to Utica, N.Y.-based Munson Machinery, a supplier of mixing and other process equipment. "They had an excellent name in the marketplace," he says. "Basically, I used their experience in manufacturing equipment since the 1800s as a guide to help me make a prudent decision. They educated me on the metals, the metallurgy involved with what we'd be doing, the porosity of the metals and how ingredients stick inside the blender, and everything else."

After consulting with the supplier, Sacco chose a 50-cubic-foot rotary batch mixer with an optional cage-style intensifier mounted at the mixing vessel's discharge end. Rotary batch mixers are engineered to blend without degrading particles, so the intensifier was critical for Kingdom Products' application to impart shear into the batch to break apart agglomerated pigment and other non-

A 3-cubic-foot-capacity mini mixer helps Kingdom Products develop and test new mix formulas.

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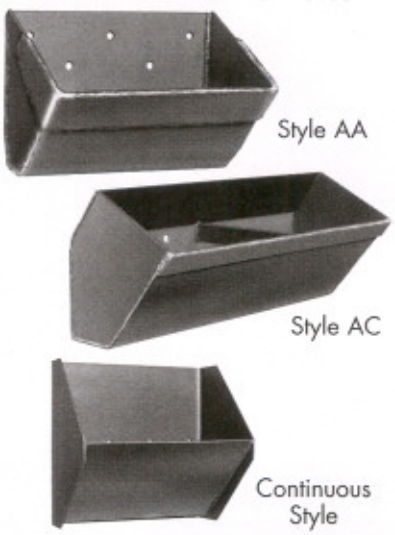

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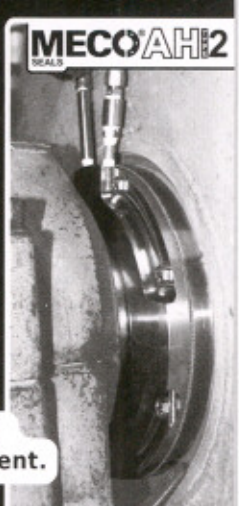

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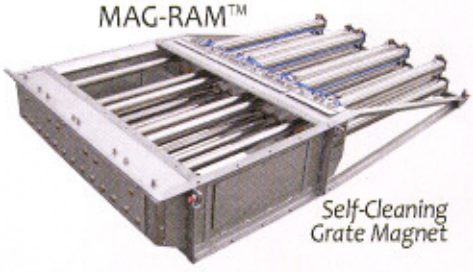

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The mixer consists of a horizontal rotating drum with a stationary inlet and outlet at opposite ends. As the drum rotates, internal mixing flights tumble, fold, cut, and turn the materials in a gravity-driven, multidirectional manner, directing them repeatedly through the cage-style intensifier's sharp leading edges, which help break apart agglomerates and evenly distribute them throughout the mix. Lifters in the continuously rotating vessel elevate the material, preventing batch segregation upon discharge through the stationary plug gate valve, leaving behind very little residual material — typically, "less than one-fourth of a 5-gallon pail," Sacco says.

He chose stainless steel construction over carbon steel. "We didn't want a porous material when working with pigments," Sacco says. Carbon steel also rusts, and rust can infiltrate and ruin customized mixes, many of which were white. "We also thought that stainless would help with cleanup," he says.

Making the concrete products

Raw materials arrive at Kingdom Products in tankers and are stored in five silos. Three are filled with different grades — one fine, one medium, and one coarse — of crushed quartz aggregate. The other two silos contain white and grey portland cement. Sacco built the entire facility to suit the blending operation, even having the silos custom-manufactured to fit inside the building and installing radiant floor heating. "We have such wicked temperature changes in northeastern Pennsylvania," he says. "I didn't want to run into moisture issues with condensation. I wanted a stable environment to control the humidity in our dry goods."

An auger conveyor feeds material from each silo through a collection hopper and into a custom-made metal bulk container resting on a weigh station.

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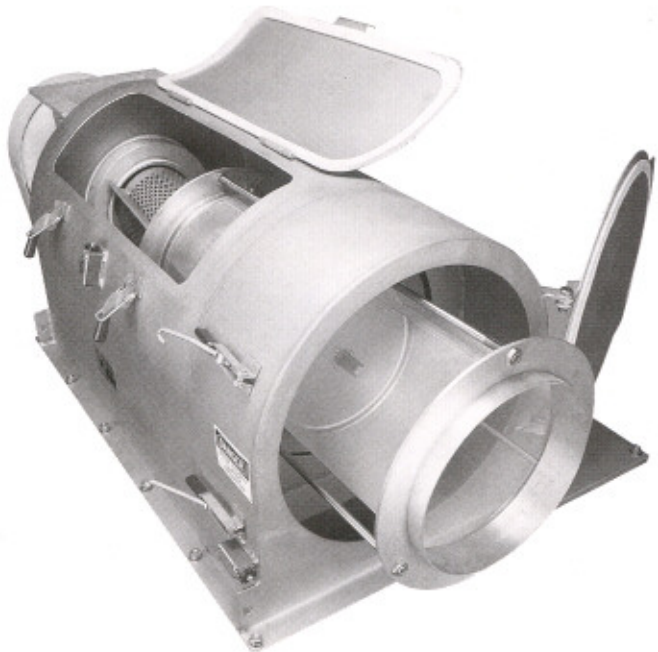

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"That way, if we have a problem with too much sand or too much portland cement, we have control over it," he says. The container is moved via forklift to the blending station, where materials are introduced into a mixer.

Additives, including pigments, are then mixed in and custom-blended into a final product. Some products require a gentle blend while others require more aggressive mixing. "Once we've blended thoroughly, we do a quality control check through an inspection port welded into the machine," Sacco says. "Then we discharge the product into a container and move it to our finished goods station."

Using a stainless steel air packer, which moves material solely via bursts of air, products are packaged, typically into 5-gallon pails or 50- and 60-pound bags.

Kingdom runs only dry materials, and after each product change, staff brushes down residual material from the mixer's interior walls and cleans out the leftovers using a vacuum with a HEPA filter. A wall separates the silos from the mixing area, and each silo has an individual dust-collection system. "You can walk through our processing area and eat off these floors," Sacco notes.

Adding another mixer

Today, more than 4 years after installing the first mixer, Kingdom Products continues to distribute a variety of products to the concrete and masonry markets. These include ultra-high-performance countertop mixes, color hardeners, release agents, overlays, custom-blended pigments, terrazzo mixes, micro toppings for resurfacing, and lightweight vertical stamp mixes used on walls and other vertical surfaces. Complaints about mixing-related color and performance issues have completely stopped, and the company recently added a second machine. The previously owned, 40-cubic-foot unit is "an exact twin" of the original

pounds. "We get the same quality as with the big machine," he says.

With his mixing-related color and performance issues resolved and the installation of his second production mixer, "We have twice the capacity," Sacco says. "We placed the mixers head-to-head for our next expansion step." Eventually, Kingdom will convert its existing fill station to a stationary weigh hopper and add a tubular drag conveyor to feed raw material directly into the mixers. The move ultimately will double production again, Sacco says, enabling him to continue expanding Kingdom Products' distribution, while CTTS will continue selling to professional installers and other wholesale customers.

As Sacco eyes the future, he's happy he chose the supplier he did for his equipment purchases. "They know those machines like we know cement," he says. "They told me what to expect, what to look forward to, and what I should avoid. You can count on what they say." **PBE**

Note: Find more information on rotary batch mixers in articles listed under "Mixing and blending" in *Powder and Bulk Engineering*'s article index in the December 2014 issue or the Article Archive on *PBE*'s website, www.powderbulk.com. (All articles listed in the archive are available for free download to registered users.)

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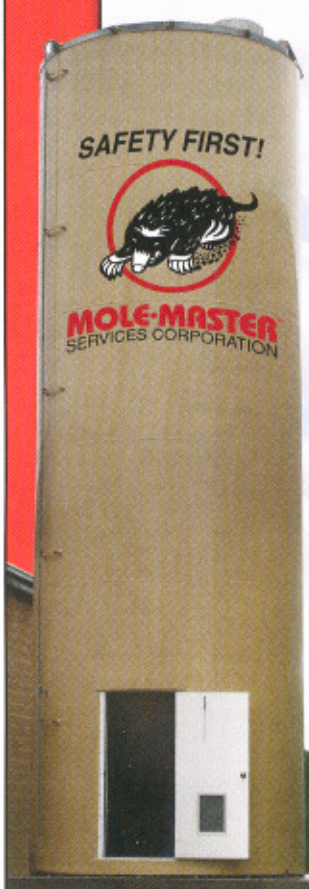

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