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Solving Color Problems with In-House Blending

Supplier issues prompted one manufacturer to take color blending into its own hands.

Concrete Texturing Tool & Supply (CTTS) began receiving customer complaints when ownership of its original manufacturer of decorative concrete materials changed hands. "We were in a situation beyond our control, with colors fluctuating dramatically," says Bart Sacco, president of CTTS, which has been specializing in decorative concrete products for more than 16 years. "Formula changes in products like hardeners affected their workability and coverage rates, and our installers experienced color shifts in the hardeners."

In response to these problems, Sacco founded Kingdom Products to make its own materials. "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."

Raw materials and pigments for decorative concrete (clockwise from top): fine vermiculite, cobalt blue pigment, 3/16-5/16-in. (4.7-7.9 mm) stone, red iron oxide pigment, 3/8-in. (9.5 mm) local crushed stone, chromium oxide green pigment. Center, 70 mesh (0.21 mm) quartz.

Getting into the Mix

Today, three years since installing its first 50-cu-ft (1.4 cu m) Munson rotary batch mixer, Kingdom Products manufactures a variety of products for the decorative concrete and general masonry market, including high-performance countertop mixes, color hardeners, release agents, overlays, micro-toppings, and lightweight vertical stamp mixes. The company recently added a second stainless steel 40-cu-ft (1.13 cu m) Munson rotary batch mixer to support the operation and offer toll manufacturing services.

Key to Kingdom's operation is its blending capability, and Sacco took the selection of the new blending equipment very seriously. "We wanted long-term yield and excellent blend," he says. "We specified stainless steel for the blenders since we didn't want a porous material when working with pigments. We also thought that stainless would help with cleanup. And we chose rotary over a ribbon-style blender because it reportedly offers five times more life."

Each rotary batch mixer comprises a horizontal rotating drum with a stationary inlet and outlet at opposite ends. As the drum rotates, internal mixing flights and lifters tumble, fold, cut, and turn the material in a multidirectional manner. The gravity-driven process produces a uniform mix in just two minutes, regardless of the difference in bulk densities of the ingredients. The lifters in the continuously rotating drum elevate the material, preventing segregation of the batch upon discharge through the stationary plug gate valve while also promoting total evacuation with no residual.

Kingdom's 50-cu-ft mixer includes an optional intensifier, which is critical to the homogenous blending of pigments throughout a batch of cement. Since

The two Munson rotary batch mixers are placed head to head.

An operator introduces hand additives to the mixer.

the rotary batch mixer is engineered specifically to blend without degrading particles, the intensifier can be activated as needed to impart shear into the batch to break apart agglomerated pigments and other non-free-flowing materials into discrete particles. As the drum rotates, specially designed baffles at the inlet end direct all batch materials through the high energy zone of the intensifier several times, ensuring uniform distribution.

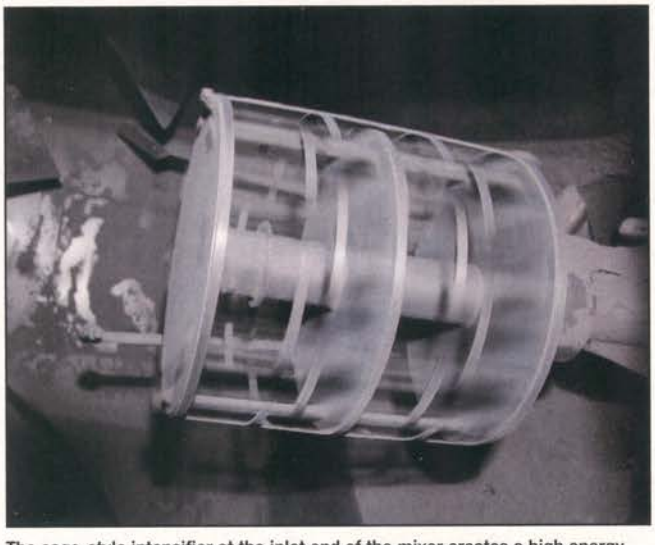
From Silo to Bag

Kingdom blends four to six batches per day. "We use different grades of quartz sand aggregate (from 100, 200, and 325 mesh all the way up to 5/16 in. [7.93 mm] and 3/8 in. [9.52 mm] chunk rock). The finest is down in the silicate flour range," explains Sacco.

The company also runs a variety of additives, such as pigments and plasticizers. "On average, we manufacture 35 to 40 different colors in hardeners alone," plus a variety of concrete restoration products, glass fiber reinforced concrete (GFRC), plaster mixes, and sculpting clay blends. "We are perfectly set up for whatever precision toll blending tasks are required of us," Sacco says.

Raw materials arrive in tankers and are stored in five silos inside the Kingdom Products facility. Three are filled with U.S. Silica (fine, medium, and coarse grades of crushed quartz aggregate), one of Essroc Grey, and one of Federal White Portland. "By keeping the silos inside and maintaining consistent temperature throughout our facility utilizing radiant floor heating, we control the humidity in our dry goods," explains Sacco. "I built our entire facility to suit the blending operation, even having our silos custom manufactured to fit inside the building. Everything in my blending operation has been specified to be manufactured in the U.S. and was one of my requirements in the purchase of our manufacturing equipment."

An auger conveyor feeds material from each silo through a collection hop-



The cage-style intensifier at the inlet end of the mixer creates a high energy zone, ensuring homogenous blends.

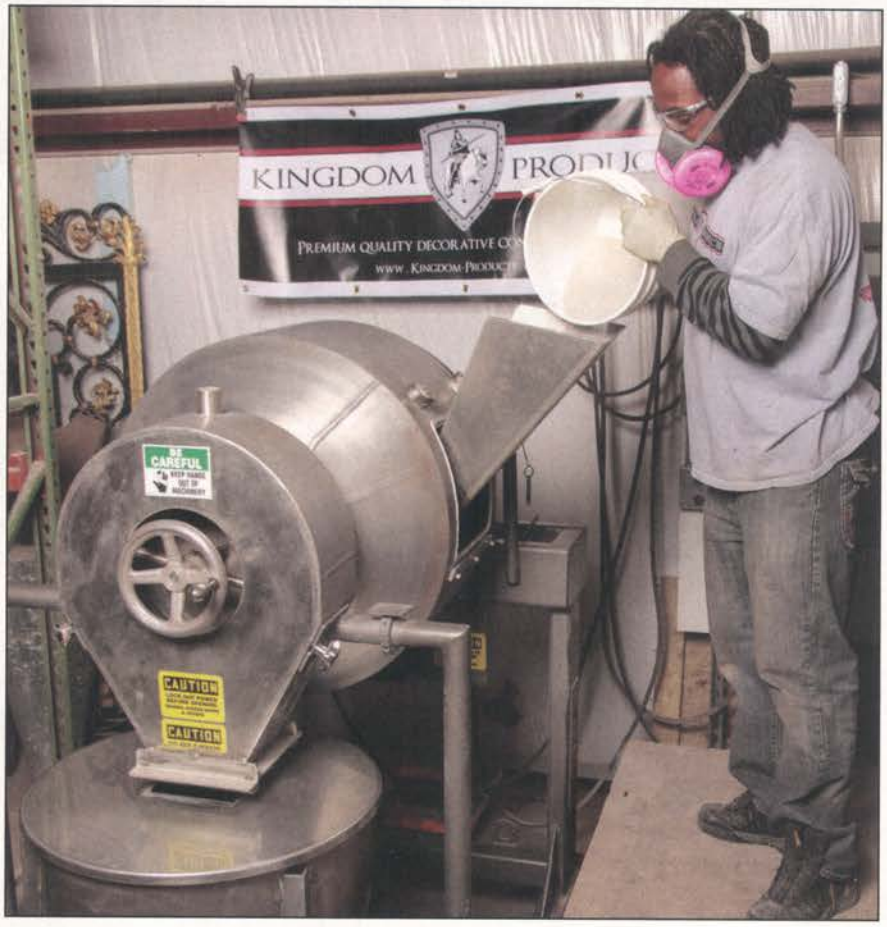
Jim Sacco takes batch samples from an inspection port for quality assurance checks.

per and into a tote resting on a weigh station. Sacco says, "That way, if we have a problem with too much sand or too much Portland, we have control over it."

Totes are moved via forklift to the blending station, where the material is introduced into the mixer. Additive mixtures, including pigments, are then added and run through customized blend cycle operations to reach a final product. Some products require a gentle blend, while others require more aggressive action.

"Once we've blended thoroughly, we do our quality control check through an inspection port welded into the machine," says Sacco. "Then we discharge into a tote and move it to our finished goods station. Using an air packer, we can package the end product in anything from pails, buckets, bags, etc." Kingdom's products are typically packed in bags of 50-60 lbs (23-27 kg) or 5-gal (18.92 l) pails.

Cleanup is minimal. "We only run dry materials," says Sacco. "In fact, our blender never sees water. Between batches, we brush everything down inside and vacuum it out with a HEPA vacuum."



Kingdom Products develops and tests new mix designs with its 3-cu-ft capacity Munson mini-mixer.

Perfecting the Formula

Many of Kingdom's new formulations are market driven. "We have developed good communication with installers using our products in the field in order to get feedback about what they want in product performance," explains Sacco. "Whether it's a finer aggregate or a longer open time, we can adjust the additive mixture to give our customers the products they want."

For example, the company recently introduced a vertical stamp mix. "Some of our customers wanted a material with improved adhesive strength, something that would cling better and wouldn't dry out as quickly," Sacco says. "All of our formulas are developed by myself or my brother Jim. When we develop the new formulation, we first run it in our lab blender, which is a 3-cu-ft (0.1 cu m) Munson mini-mixer. It's equipped with the same intensifier and represents what we will get on the larger blender."

New formulations are ramped up using the mini-mixer from a few hundred grams to a few hundred pounds (used for field and other testing). Production then moves to the 50-cu-ft mixer to produce 4,500-lb (2,041 kg) batches or the 40-cu-ft mixer to produce 3,000-lb (1,362 kg) batches.

Expansion on the Horizon

With plans to expand Kingdom Products' toll manufacturing operations, Sacco purchased the used 40-cu-ft Munson rotary batch mixer. "Even though it had been sitting outside for more than two years, the mechanics exhibited no wear," he says. "We reconditioned it, repainted the framework, put in new seals, and installed it in January 2014.

"Excluding the intensifier, it's an exact twin of our original 50-cu-ft rotary batch mixer. Rock aggregate—countertop mixes—can be mixed without the intensifier, so a lot of items we manufacture are well-suited for the 40-cu-ft machine.

"We placed the mixers head to head for our next step of expansion. We will convert our current fill station to a stationary weigh hopper, and then add a tubular drag conveyor to feed raw goods directly into the two mixers. Blended materials are discharged into a tote and transported the way we do it now.

"Adding the second stainless steel Munson rotary batch blender to our original equipment allows us the utmost flexibility in blending. We can add as much or as little shear into manufacturing the products, giving us flexibility to blend just about anything without degradation of particle size. Since most of our products are colored, the two blenders allow us to manufacture both pigmented and non-pigmented products simultaneously, doubling daily production. With the second Munson on line and hooking up the future tubular drag, we can increase our production again by more than 100%. We are ready for the future." **CI**

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