Finding a Way to Handle Dry Ingredients to Slash Process Time

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Oceanside Glasstile is a leader in the design and production of handcrafted glass tile. Headquartered in Carlsbad, CA, the company transforms raw sand and recycled bottles into luxurious yet functional glass tiles and mosaics for walls, floors, countertops and pools. Products are sold through retail showrooms in the U.S., UK, Europe and Japan. The worldwide growth of the upscale housing market, as well as the adaptability of the products to custom design, has helped Oceanside Glasstile grow at double-digit rates for several years. In late 2004, with production hitting near historical highs and new products ready to emerge, the company decided to improve a major facet of its operations &#151 the way powdered ingredients are received and handled. The company hoped to reduce not only mixing time but also total process cycles and to lower labor costs. It also sought to improve the trackability of ingredient use and, therefore, color consistency between batches. The first design concept considered was a fully automated batch charging system engineered by a San Diego firm. Its $800,000 to $1 million price tag meant, however, that the return-on-investment was far in the future &#151 far enough that the technology it was based on might be outdated before that benchmark was realized.

A fundamentally different concept was engineered and proposed by a Cincinnati manufacturer, Ingredient Masters. It was a manual system but it offered many of the speed and efficiency advantages of a fully

automated format. Its cost was less than $200,000, turnkey. When reviewing the price, Oceanside Glasstile thought Ingredient Masters had missed something, but the pricing was correct. As a result, the company wanted to see what the engineers in Cincinnati had in mind. At the time of these discussions, Oceanside Glasstile had received 10 major dry ingredients and 14 minor chemicals in 50-pound paper bags. Incoming material was manually emptied into one of four 55-gallon drums, each accommodating 300 pounds of material. Drums were rolled and mixed in a process that required one-half hour per barrel &#151 seven hours total &#151 before the material could be transferred to a bagger, inverted, put on a pallet and staged at the furnace, where the 4,200 pounds of material that comprised a batch awaited processing. The manual handling of bags and drums meant there was continuous lifting and significant dust from bag dumping and from the dragging of bags across the factory floor. Manual beam scales were used to weigh ingredients, but there was no provision for printing or archiving batch information. Material use was tracked manually by the operators. The system the company evaluated in operation was a fully computerized 20-unit batching system used by a manufacturer of solid surface acrylic countertop material. A digital scale cart moved between 20 dispensers according to one of 200 programmed recipes. Flow rate and ingredient weight values were consistently accurate to within &#1770.5 percent or better. The system was local network compatible and RFID-capable.

Oceanside Glasstile gave a formal nod to the Ingredient Masters proposal. At the core of the system are a dozen 70-cubic-foot hopper dispensers called "day bins" which, in this case, hold a day's worth of material. Rotationally molded of polyethylene, they allow easy viewing of material levels. Polyethylene dispensers remain "sweat-free" when temperatures fluctuate, a major benefit because ingredients can be hygroscopic. The dispensers have a liquid-smooth interior, which combined with the dispenser's geometry facilitates good flow for most ingredients. Since ultra-fine colorant powders are notoriously flow-resistant, these dispensers have vibratory pads, which use pulsed air to fluidize the material. Above each dispenser is suspended a 2,000-pound capacity super sack, a flexible woven polypropylene sack that is UV-treated and reusable. Sacks are provided in a variety of fabric weights to meet specific tensile strength requirements. They can be handled with forklifts, eliminating ergonomic stressors and the tearing and disposal of paper bags. They also save space. Plus, raw material suppliers were willing to package in the sacks with no increase in cost. A separate rack holds 8-cubit-foot and 3.5-cubic-foot dispensers containing sufficient quantities of minor ingredients to last up to 30 days. When the operator is ready to run a batch, he uses Microsoft Access to print a "pick sheet" showing the major and minor ingredients needed. The ability to do this on the shop floor, rather than involve office personnel, is a substantial time-saver. A hopper-bottom bin is loaded onto a digital scale cart, which displays the formula and required elements. The cart is driven to the first dispenser required for that batch and loaded. A signal is sent to the system PC, recording in Excel format the material dispensed. The scale is then "zeroed" and driven to the next dispenser. The real-time recordability is useful for inventory management as well as batch tracking. When all ingredients are dispensed, a report is generated and the bin is locked under a mixer. It is rotated for 10 minutes and then positioned on top of a screw auger. The bin bottom releases, and the auger feeds the material into the

furnace. Dust, always a challenge for dry material processors, is collected at every station when material is dumped as well as at the bottom of the hopper-bottom bin when it is lowered for furnace charging. Dust collection, and re-use of collected particulate, is an integral part of the system design. The system also reduces "housekeeping" chores and contributes to good indoor air quality and a good work environment. Oceanside Glasstile has been a "green" company by design since it was founded in 1992. It is now able to reclaim the vast majority of its glass melt trim and edge material. Material is crushed and stored in a day bin; the PC is programmed to allow a given percentage of remelt per batch; and the revised quantity of virgin ingredients is calculated based on the rework material available. Recycled bottle glass is also a primary ingredient. Some products have up to 85 percent recycled glass. The time between design approval and commissioning of the new system was 16 weeks. Process recipe programming and controls interface were completed five days later. The time to make a batch went from 75 to 10 minutes, and the company is now able to feed 4,200 pounds into a furnace in two minutes instead of several hours, using three hoppers instead of 14 drums. There is less material handling and no floor sweeping, and the hazardous waste burden of silica is far less. Workers no longer have to struggle with drums and 50-pound bags, and no one has to stand in front of a 2,200&#176F furnace, chucking in pounds of material. Material accuracy is &#1770.5 percent or better, and there is greater consistency in colors. The company also has plans for various contingencies. A bag break platform was installed so that if a future ingredient was only available in 50-pound bags, it could be quickly loaded into a super sack and put in a lifting frame. *Mike Taylor is purchasing manager at Oceanside Glasstile, and Scott Culshaw is president of Ingredient Masters, 1080 Nimitzview Dr., Ste. 302, Cincinnati, Ohio 45230. Additional information about such ingredient handling systems is available by calling 888-345-4729 or visiting www.ingredientmasters.com.*