

SOLIDS & BULK HANDLING

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Storage, Control, Movement and Processing of Loose Materials

Green cement

Blending of would-be landfill turns out greener cement based products thanks to Munson Machinery

The vision of a greener future for the construction industry motivated Andrew Dennis, an architect who founded a company dedicated to producing environmentally friendly cement-based products.

Instead of the heavy aggregates found in standard concrete, the materials made by GigaCrete include non-silica based sands and by-products of coal combustion, fly-ash and bottom-ash and recycled glass that are usually dumped into landfills. The recycled materials are mixed with GigaCrete's own mineral cement formulation, which requires less water and yields less carbon dioxide in production than Portland cement, according to the company. In addition, GigaCrete claims that its materials are lighter and easier to handle than conventional cement based materials.

GigaCrete makes several cement-based building products that are packaged in 23kg bags and shipped in dry-powder form to users who mix them with water at the construction site. The bagged products include:

- PlasterMax IND, a one-step decorative interior plaster coating providing high strength and abrasion resistance when used as a protective finish over gypsum-based drywall.
- PlasterMax ICF, a two-coat interior plaster system replacing drywall, providing fire, abrasion and impact resistance.
- GigaFloor-IN, a stamped concrete overlay featuring fast installation, high compressive strength, and crack resistance.
- StuccoMax-ICF, an impact-resistant stucco product used as an exterior finish over insulated concrete forms.

In addition, GigaCrete makes a wet mixture used in the production of its PanelSystem construction product, which includes lightweight panels cast in GigaCrete's plant and delivered to job sites ready for installation. The system also includes patented steel connectors and components for door and window openings.



ABOVE: Andrew Dennis, chairman and founder of GigaCrete, displays bag of PlasterMax ICF building product. Behind are Munson rotary batch mixer (L) and continuous paddle blender (R)

GigaCrete products comprise two parts cement binder and up to three parts filler, which can be sand of different grain sizes or ash of various grades. The products are typically made using 80% filler and 20% binder.

Each ingredient is supplied in 1361kg bulk bags and unloaded by one of five bulk-bag dischargers to make a batch, depending on recipe. The dischargers are supported on load cells that measure weight loss as flexible screw conveyors move material from hoppers below the dischargers, into a common, horizontal aeromechanical conveyor at ground-level. The material is fed into a vertically oriented, 3.7m aeromechanical conveyor, which elevates the material before discharging it into a dry or wet mixer, depending on recipe.



ABOVE: Powder transfer system, consisting of five bulk bag dischargers, prepare a batch as aeromechanical conveyors transport material to one of the two mixers.

Blending the ingredients

Both the dry and wet mixers are loaded with a 907kg batch of binder and filler material, with water in the wet mixer adding an extra 20% to the weight of the charge. For dry blending operations, GigaCrete uses a 0.57 cu m Rotary Batch Mixer from Munson Machinery, consisting of 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 100% 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, as well as promoting total evacuation with no residual. The discharged blend falls through a "pant leg" chute into a hopper and then into a turbo-packer that can fill as many as four 23kg bags a minute.

For the wet panel mix, GigaCrete uses a 2.8 cu m continuous



ABOVE: Operator fills bag from turbopacker below the rotary batch mixer

paddle blender, also from Munson, consisting of a stationary mixing trough with rotating paddles that are driven through the material. The blender's horizontal shaft rotates inner and outer paddles with reversed pitches that move materials in opposing directions. A 2-to-1 agitator length-to-width ratio optimises mixing performance, agitating the material during loading, 10-minute blending of solids and liquid, and discharge.

The paddle blender is also doing double duty as an additional dry mixer, and has a mobile impeller bagging machine beneath

the output valve for that application.

The blender's design limits maximum mixing capacity to approximately 80% of total vessel volume, leaving sufficient space for material flow on the upswing side of the agitator. This also allows the spray manifold to be properly distanced from the material bed surface, which ensures even distribution of liquids added to mixtures.

Other key features include the stationary mixing trough's heavy-gauge walls and reinforced end panels, providing sufficient rigidity for tight agitator-to-vessel wall tolerances that minimise the "heal" of residual material after discharge.

Wet concrete mixtures gravity discharge from the paddle blender into a hopper, from which they are pumped 9 to 15m into mold boxes measuring 0.6m by 2.7m by 108 mm. After a day of curing, the panels are removed from the mould boxes and are ready for shipment.

GigaCrete's goal for the plant is to produce 558,000 sq m of panels per year and 300,000 bags of dry material per eight-hour shift. These estimates were provided to Munson personnel, who used them to select mixing devices capable of meeting GigaCrete's output requirements. GigaCrete also provided Munson with material samples so the supplier could observe how the different densities affected the equipment considered for the dry and wet applications.

The GigaCrete corporate office is head-quartered in Scottsdale, Arizona, and its GigaLabs plant and research and development centre is located in Las Vegas, Nevada. The company expects to open four more plants across the U.S. "This is the pilot factory," Dennis says of the Las Vegas facility. "The goal is to refine the process here and then use the final process in the next four plants."

For more information contact Munson Machinery by email: info@munsonmachinery.com or visit: www.munsonmachinery.com

Quick solution

Utranazz, the concrete equipment specialist, has added the Mobil 3 wet batching plant to its range. The Mobil 3 can be quickly assembled in just four simple steps and is up and working in only two days. It is capable of producing up to 80m³/hour of wet concrete, making it ideal for 24/7 large volume quality concrete production.

The compact design of the Mobil 3 plant makes it easy to transport and its pre-assembled modular design ensures it can be set up in four simple steps. Step one: unload from lorry. Step two: assemble framework and ladders. Step three: unfold panels to create aggregate bins and lift Pan Mixer into position - the Pan Mixer is integrated into the framework and simply unfolds. Step four: connect control panel to mains power supply - the control cabin is pre-wired and easily connects to all controls. In addition, the plant requires minimum ground preparation and can be set up on only 60 sq. metres of hard-standing.

The Mobil 3 is fitted with a Forced Planetary Pan Mixer which ensures a superior homogenised concrete mix, it is especially suited to specialised and difficult product mixes and also screed and mortar. The entire plant is managed via a control cabin,

which is fitted with touch-screen panels and A4 paper printer to ensure trace-ability and quality assurance. Furthermore, the Mobil 3 is fully galvanised to ensure maximum durability. For more information visit: www.utranazz.com

