

Custom processor

Custom processor features computer-based controls, large inventory, and variety of equipment for blending and packaging

Let's take a walk through a blending and packaging custom processor that went on-line just last year. We'll look at the operation from raw-material storage to finished-product shipping and glance at all the equipment in between.

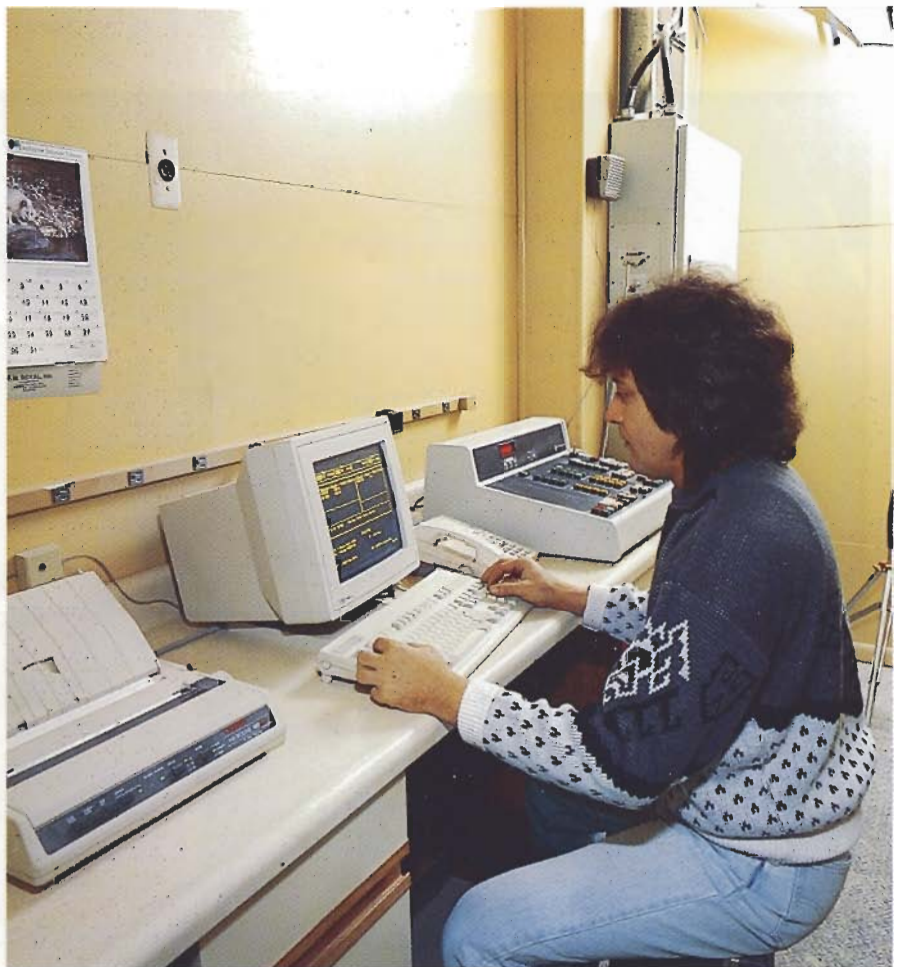
Empire Blended Products® Inc. is a custom processor that blends, packages, stores, and transports materials and products. The Bayville, N.J., plant, completed in May 1992, is designed for flexible, high-volume production and specializes in concretes and grouts with multiple additives.

Computer, PLC manage production

A personal-computer-based programmable logic controller (PLC) simultaneously manages two of the custom processor's production lines, controlling eight 50-ton silos that have a self-cleaning, traveling weigh hopper below. The weigh hopper feeds two 8-foot by 3-foot paddle mixers, each discharging into a

surge-storage hopper over a bagging station that can pack containers as large as bulk bags.

The custom processor programs all formulas, mixing times, and silo information into the proprietary computer. In about 1 minute, an operator can program the computer to simultaneously process a set number of batches of two products. The computer automatically controls all eight silos, the weigh hopper, and the paddle mixers, alternately weighing batches of each product to keep the surge-storage hoppers full. When it's time to manually add the minor additives to each batch, the computer signals a worker, stops the mixer, and resumes mixing when the worker is done. A



Empire Blended's personal-computer-based programmable logic controller can simultaneously manage two production lines.

6,000-pound batch, with raw materials from three silos and one minor additive, can typically be weighed and dropped into the mixer, where the additive is added and the batch thoroughly mixed, and finally discharge into the surge hopper in less than 4 minutes. Hundreds of safety factors have been programmed into the computer to safeguard the entire batch weighing and mixing system. The computer audibly signals a worker if something is wrong.

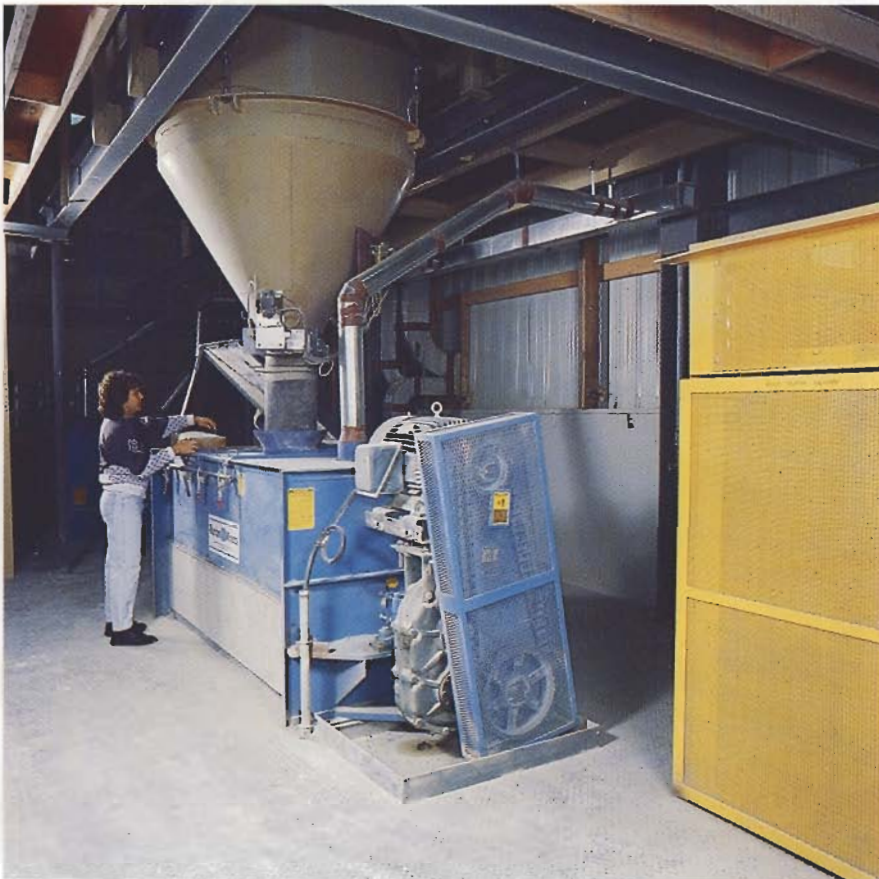
Silos store, weigh hopper batches wide material inventory

The custom processor's equipment variety and large material inventory allow the company to select from a variety of bulk materials and mix them in many proportions with any number of additives. The inventory also speeds order turnaround. [Editor's note: For an example of a fast custom processing job, see the related item, "Custom processor

blends speed and accuracy for rush specialty-concrete order."]

The custom processor either has in inventory or can get within 24 hours all grades of portland cement, masonry cement, special cements, gypsum cements, many grades of industrial sand, white sand, marble, limestone, and 3/8-inch gravel. Trucks deliver bags of the raw materials, which are then stored in a warehouse. Trucks also deliver bulk materials that are pneumatically transferred to the storage silos. Empire Blended's president Jay Gornitzky and vice president Martin Tanzer designed the silos, which were installed by subcontractors under Gornitzky's and Tanzer's supervision. Each silo has a 1,125-cubic-foot capacity, the equivalent of 112,000 pounds of sand or 106,000 pounds of cement or limestone, which is two full truckloads of material. The characteristics of the material to be stored determined the silos' cone sizes and angles and the outlet sizes.

A 6,000-pound batch, with raw materials from three silos and one minor additive, can typically be weighed and dropped into the mixer, where the additive is added and the batch thoroughly mixed, and finally discharge into the surge hopper in less than 4 minutes.



A traveling weigh hopper discharges into paddle mixers.

Custom processor in action:

Custom processor blends speed and accuracy for rush specialty-concrete order

A concrete mix manufacturer in Fairfield, Conn., employs custom processors to mix and package products at about 15 plants across the US. Using several plants increases profit by cutting transportation costs. "You have to process the concrete mix at a plant near the product's destination, because it's not a high-profit product. You can't ship to more than a 150-mile radius and make money," said the manufacturer's production manager.

In the early part of its busy March-June season in 1992, the concrete mix manufacturer had to replace its New Jersey custom processor. As orders piled up, the manufacturer paid high shipping costs to send customers products from plants in Pennsylvania and Connecticut, about 100 miles further than the company wanted to ship. "In some instances we just broke even shipping product. It kept our customers happy, but we couldn't afford to do it forever," the production manager said.

So the concrete mix manufacturer sought a closer custom processor to manufacture its product line, which includes unique blends of sand, cement, and specialty additives. Special bulk cements used in production require silos. Processing requires multiple batch formulations that include hand-adds in the blending process.

Through the International Package Concrete Manufacturer's Association (IPCMA), the production manager met Martin Tanzer, vice president for Empire Blended Products. The production manager visited the custom processor's plant. "I con-

stantly travel around looking at plants for future needs and whatnot. When I went there, I just knew by the way the plant was set up that it was going to be excellent."

In this case, the custom processor sent samples of portland cement and sand to the concrete mix manufacturer's laboratories, which verified the manufacturer's products could be formulated with the custom processor's materials.

Initially, the manufacturer needed approximately 15 truckloads of specialty concrete mix in 40- and 60-pound bags, half to be delivered as soon as possible. The job entailed blending a specialty cement with aggregate and two proprietary additives. For the job, the custom processor used three 50-ton silos, a traveling weigh hopper, a 6,000-pound paddle mixer, two impeller packers, a palletizer, a stretch wrapper, conveying equipment, and computer controls.

The job was done accurately in 3 days. The manufacturer attributed the work's high quality to three things: The efficient computer-controlled production lines in the new Empire Blended plant (the blenders can turn out 6,000-pound batches in minutes); the wide range of raw materials available on site; and the custom processor's attention to detail and service. In addition, the semiautomatic palletizer and stretch wrapper loaded attractive and secure pallets.

After testing the first production run against the manufacturer's quality control standards, the custom processor shipped approximately half and stocked the rest for future orders. **PBE**

Four silos store sand and aggregates and four store cement, limestone, and other powders. The four powder silos have aerator pads to assist material discharge through four 12-inch screw conveyors into the self-cleaning traveling weigh hopper. Six-inch air-operated slide gate valves control material flow from the four silos for sand and aggregates into the traveling weigh hopper.

The 6,000-pound-capacity traveling weigh hopper, also designed by Gornitzky and Tanzer, is 6 feet in diameter with a 6-foot-tall cylindrical cone section. The steel weigh hopper is suspended on four electronic load cells and linked to the main computer and a man-

The custom processor chose paddle mixers and ribbon blenders because they blend quickly, produce a homogeneous mix, run quietly, require little maintenance, and handle many raw materials and products.

ual control panel. The weigh hopper is accurate to within ± 5 pounds per 2,000 pounds of each ingredient. The hopper rolls back and forth on a frame with wheels that ride on a track designed to keep the hopper from derailing. Motors

power the chain-driven hopper, gradually slowing it as it nears its destination.

Two filling stations each receive material from four silos and sequentially add the materials to the weigh hopper. When a desired weight is reached, the next material is added and so forth until all the required materials have been added. The weigh hopper then discharges through a slide gate valve programmed to stay open until the hopper is completely empty, as indicated by a zero weight reading. An epoxy-coated interior and an electric vibrator promote material discharge from the weigh hopper. The weigh hopper connects to each paddle mixer's top through a 12-inch-diameter flexible rubber chute.



Two impeller packers for valve bags fill 60-pound bags of instant concrete.

Processor blends, packages, palletizes products

In addition to the paddle mixers, the custom processor installed five ribbon blenders in other production lines. The processor chose paddle mixers and ribbon blenders because they blend quickly, produce a homogeneous mix, run quietly, require little maintenance, and handle many raw materials and products. The mixers and blenders have high-horsepower motors and gear reducers to start without strain when fully loaded.

The traveling weigh hopper feeds the paddle mixers, and the ribbon blenders are fed by bucket elevators, belt or screw conveyors, or by hand. Four ribbon blenders are used at open-mouth bag blending-packaging stations. One blender discharges into an auger-type packer to fill packages weighing from 1 ounce to 15 pounds.

Each paddle mixer discharges into a 12,000-pound-capacity surge-storage hopper made of steel with a cylindrical cone and a discharge splitter. The dis-

charge splitter simultaneously feeds two side-by-side airflow packers for valve bags. The custom processor chose the packers because they handle powders, aggregates, and powder-aggregate mixes. The packers are fully automatic except for bag placement; a worker simultaneously places bags on both packers. Each packer automatically grabs the bag, fills it to the desired weight, and discharges it. Each single-head packer fills as many as 10 bags per minute to within ½ percent accuracy.

To fill cans, open-mouth bags, and valve bags, the custom processor chose two impeller packers for high weighing accuracy and packaging versatility. Each packer looks like a standard valve-bag packer, but quickly converts to fill cans or open-mouth bags. Each packer operates the same as an airflow packer and fills as many as 10 bags per minute.

The processor also has two small-package filling stations with auger-type packers that can handle powders or freeflowing materials. The packers have changeable filling heads to pack from 1 ounce to 15

pounds into plastic containers, cans, bottles, and paper or plastic bags.

At four open-mouth bag blending-packaging stations with sewing capabilities, raw materials are added to blenders directly or via a bucket elevator or a belt conveyor and then mixed for a preset time. Dedicating each of the four blending-packaging stations to a different product range allows the custom processor to run four diverse products simultaneously. The four stations can also quadruple production without risking product contamination.

The first blending-packaging station handles cementitious and aggregate products. A heavy-duty bucket elevator loads a 6,000-pound ribbon blender, and a packer fills from 15-pound bags up to 3,000-pound bulk bags. The second station handles white cementitious, gypsum, and limestone products. A belt conveyor loads a 2,000-pound ribbon blender and a packer fills 15-pound bags to 500-pound drums. At the third and fourth stations, manually loaded 500-pound ribbon blenders mix materials and discharge directly into 25- and 50-pound bags. The third station blends natural earth pigments and iron oxide pigments, and the fourth station blends black iron oxide and carbon black. At each of the four stations, the mixed products are packed into open-mouth bags at a rate of 2 bags per minute, which are then sewn shut and palletized.

The processor's semiautomatic palletizer stores 10 empty pallets. A belt conveyor moves filled bags to the palletizer, where a worker arranges one layer of bags at a time. The layer of bags automatically lowers onto a pallet, and the palletizer resets to accept another row. A filled pallet automatically lowers onto a belt conveyor and moves to a stretch-wrap station. The palletizer then sets up for another pallet, while an automatic stretch wrapper equipped with its own PLC wraps the pallet a preset number of times from top to bottom at a specified tension. A conveyor then moves the wrapped pallet from the stretch wrapper, and a forklift truck moves the pallet to a truck or the warehouse.

Custom processor provides versatile service

Empire Blended will use any combination of the customer's materials or its



A worker arranges one layer of bags at a time on a semiautomatic palletizer.

own specialty cement products and industrial grades of sand. The processor handles stringent formula requirements to blend sand, aggregates, and cements with multiple additives, including polymers, resins, and epoxies. Regardless of production-run size or package size, the processor will blend and package non-shrink grouts, structural concrete repair products, and specialty cement repair products in bags, boxes, cans, or bottles.

The custom processor's diverse equipment and large material inventory allow the company to handle a wide variety of bulk materials, mixing them in virtually any proportion with any number of additives.

Given a product formula or material samples, the company will run test batches to demonstrate blending quality and accuracy. The processor generally requires a 5-pound material sample with a Material Safety Data Sheet. The custom processor's lab can prepare small product batches, perform a mesh-size analysis, and field-test the basic properties of cementitious products. The processor's blenders range in capacity from 500 to 6,000 pounds and are easily cleaned between products, making it easy to run a preproduction batch.

The processor's facility, which covers 30,000 square feet with 20,000 square feet of warehouse space, is between

Philadelphia and New York and operates its own fleet of trucks to pick up raw materials and deliver finished products. The processor uses 26 flatbed trailers, one yard tractor for material shifting, and 14 owner-operated rigs. Orders are often completed within 48 hours of material



Pallets are stretch-wrapped before being loaded onto trucks or moved to a warehouse.

delivery. The processor determines blending, packaging, warehousing, and trucking rates job by job. The rates depend on material type, packaging type and size, and production volume. Warehouse rates are based on floor space required and trucking rates depend on shipment weight and distance. PBE

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Equipment manufacturers:

Paddle mixers: **Marion Mixers, Marion, IA, 319/377-6371 #353**

Ribbon blenders: **S. Howes Co., Silver Creek, NY, 716/934-2611 #354**

Airflow packers: **Taylor Products, Parsons, KS, 316/421-5550 #355**

Impeller packers: **Eastern Packaging Services, Allentown, PA, 215/264-2080 #356**

Auger packers: **Mateer Burt, Wayne, PA, 215/293-0100 #357**

Stretch wrapper: **Liberty Industries, Girard, OH, 216/539-4744 #358**