

**DRY BULK BLENDING
EQUIPMENT**

- Rotary Batch Mixers
- Ribbon/Paddle/
Plow Blenders
- Rotary Continuous
Blenders
- Variable Intensity
Continuous Blenders
- Vee-Cone Blenders
- Fluidized Bed Mixers

**SIZE REDUCTION
EQUIPMENT**

- Shredders
- Lump Breakers
- Heavy Duty Cutters
- Knife Cutters
- Pin Mills
- Attrition Mills
- Hammer Mills
- Custom Machinery

CH-006

Batch blenders make modern mortars in China

SureBlock

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With no internal moving parts, blenders minimize abrasive wear and simplify cleaning at two SureBlock plants.

In 1997, US-based SureBlock entered a joint venture with China's Tianjin People's Building Material Products Factory to make concrete masonry units (CMUs). Commonly known as concrete blocks, CMUs come in many shapes, sizes, and colors. They are mainly used to erect structural walls, pave walkways, and build retaining walls. Since the industry's development in the early 1900s, concrete masonry has become one of the world's most popular and versatile building systems.

But not in China, the land of the Great Wall. There, red clay bricks have been the standard building material for centuries. The absence of CMUs and their superiority over red clay bricks prompted SureBlock to enter the Chinese market. In June 1998, the company expanded to a second plant in Shanghai, and a third plant will open in Beijing later next year. Today, production capacity is approximately 20 million standard units per year.

Reliable mortar

In addition to CMUs, SureBlock makes many related masonry products. These include packaged dry mortar mixtures for setting the block, grouts for filling the voids between the blocks, thin-set adhesives for setting tile, and galvanized wire for reinforcing the structures. The company also supplies wall insulation, masonry coatings, and fasteners. All the products are guaranteed to meet China's highest building materials standards, as well as those of North America, Europe, and Australia.

When SureBlock came to China, there was no domestic supply of pre-mixed, packaged dry mortar. Instead, workers just gathered the ingredients at the construction site and proportioned and mixed them by hand as needed. This traditional on-site method raised many questions about quality: Were the raw materials clean and graded to the proper size? Would the ingredients become contaminated from other activities at the site? How well could workers proportion the ingredients? Did the site-mixed mortar meet project specifications in terms of water retention, workability, air content, color, compressive strength, and other properties? Using a modern mortar from SureBlock would put all these question to rest. Construction crews would only need to add the correct amount of water.

The process

Making high-quality mortar begins with the raw materials. Ingredients in mortar include dry sand, 10-millimeter dry gravel, synthetic iron oxide pigments, quartz sand, lime, cement, fly ash, and admixtures. Each of the ingredients is dry and abrasive. Bulk densities are approximately



After weigh-batching, the ingredients for the mortar enter the blender from above. The blender rotates during filling, blending, and unloading to prevent segregation.



The blender discharges the batch from the opposite side. Cycle times are typically 2 to 3 minutes. Working volume is 2.5 cubic meters and cleaning is easy.

1,600 kilograms per cubic meter, and most ingredients are free-flowing.

The mortar-making process begins at a fluid-bed dryer that removes moisture from the sand using super-heated air while simultaneously removing unwanted fines. After drying, the sand passes through a multiple-deck vibrating screener. Oversize sand and gravel are rejected, and the good sand passes through another screener to divide it into coarse and fine grades. The graded sand then travels by conveyor to storage silos. Other silos hold the lime, pigments, cement, fly ash, and other ingredients.

Next, the dry sand, lime, cement, and other ingredients are weigh-batched and dry-blended according to customer requirements. Then the mortar is conveyed to a holding silo to await packaging into valve bags or bulk bags (FIBCs). Filled valve bags weigh 25 or 50 kilograms. Bulk bags hold 1 cubic meter of mortar and weigh 1,000 kilograms. Finally, the bags are placed on wooden pallets and stretch-wrapped for easy warehousing and subsequent shipment to the construction site. The entire process is computer controlled. Workers inspect all raw materials and each finished batch to ensure quality.

Blender provides flexibility, durability

Like every plant that processes stone products, SureBlock's dry mortar plants require rugged machinery that withstands abrasion. Blending machinery is especially at risk of abrasive wear and must be selected with care. SureBlock's requirements for its blenders included easy cleaning, compact design, and after-sale support, said Mike Crowley. He is the managing director of operations and engineering and the general manager of the Tianjin plant. He found what he needed in a horizontal batch blender supplied by Munson Machinery of Utica, NY USA.

"We knew that we would be manufacturing a large range of products, at first in small quantities. It was therefore important to have a blender that was easy to clean," he said. "Of the blenders we looked at, it was the only one with no internal moving parts. And we were looking for a compact, low-profile blender to fit into our design because space for our facility was limited," he said. (The blender stands about 2.2 meters high and 2.5 meters wide.) "[The supplier] also gave us the feeling they were able and willing to support their products in China," he added. "This blender matched our requirements."

The blender uses lifters and baffles inside the mixing chamber to create a rapid but gentle mixing action that fluidizes the ingredients. Cycle times are typically 2 to 3 minutes and product degradation is minimal. Working volume is 2.5 cubic meters, and a self-adjusting face seal ensures dust-free operation. The blender rotates during filling, blending, and unloading to prevent segregation.

"Startup as far as the blender was concerned was faultless," Crowley said. "We installed and commissioned the blender without [the



A view of SureBlock's pre-mixed mortar plant in Tianjin, China.

supplier's] engineers. Commissioning took 10 days for the whole plant."

The blender is easy to operate, Crowley said, which was another important selection criterion. "We were new to China and unsure of the local workforce's true capability. We would be operating this equipment far from home, so we wanted a reliable blender from a company that could provide support if needed from a distance." Regular maintenance includes cleaning, lubrication, and adjustment. Since the blenders were installed at Tianjin in 1997 and at Shanghai in 1998, no support was required. "We have made few repairs to our blenders, and we have never had to consult with [the supplier]. The cost of operating these blenders is also low," he said.

More production, more blenders

"We operate our plants to suit market demand," Crowley said. That may require one 8-hour shift over a 40-hour week, or up to four shifts running 24 hours a day, 7 days a week. Whatever the work schedule, the market for high-quality masonry products remains strong, and SureBlock is now ready to expand.

"We have plans for new manufacturing sites in Beijing, Nanjing, Shenzhen, Shenyang, and Dalian," Crowley said. "On future blenders, depending on current R&D, we may blend fibers into some of our products," he added. "Fibers may be a problem. We are investigating it." The supplier has equipped several installations with batch mixers for handling poly, carbon, and steel fibers.

During his investigation, Crowley will likely use some of the same selection criteria he used to specify the rotary batch blenders. He offered the following advice to others who are preparing to select blending equipment.

"First, decide your specification. Know what products you are likely to blend," he said. In discussions with suppliers, he suggested these questions:

1. "How long have you manufactured this type of equipment?"
2. "How many machines do you have operating?"
3. "Can I seek references from your customers?"
4. "Can we test our materials in your blender?"
5. "What support do you offer in terms of spare parts, service, and problem-solving?"
6. "How well can your machine meet our specification?"

Crowley suggested waiting until the specification is on target before negotiating the purchase price. "If you fix the specification first, then lowering the purchase price does not cut the machine quality."

Conclusion

SureBlock faced many challenges in establishing its manufacturing operations in China. "We designed the plants in China, but not all of our methodology, technology, and practice were understood," Crowley said. "This, coupled with interpretation problems, caused some problems."

The ongoing challenge is to develop a market for products for which there are no industry standards or construction codes. "This hinders sales until codes can be written," Crowley said. In addition, "Raw material suppliers do not understand our requirements for quality consistency and supply. We often reprocess raw materials because of contamination." In contrast, blending has been problem-free. "We are thankful we picked a good blender. Our blenders have operated faultlessly since 1997."