

Case history

Toll processor chooses volumetric over loss-in-weight feeders

A toll processor cancelled plans to use loss-in-weight feeders when an equipment manufacturer convinced them simpler was better.

Therm-O-Rock Corp., New Eagle, Pa., is a toll processor that custom blends and packages minerals to produce specialty products for the steel, foundry and construction industries. Such products include exothermic compounds, foundry sands, cements and grouts. Therm-O-Rock also provides a quality control service to customers, which entails checking the quality of material received, material in process and product to be shipped.

The processor handles powders with negligible moisture content and with particle sizes ranging from 4 down to 325 mesh. Bulk density ranges from 15 to 150 lb/cu ft. Finished product is shipped in bag sizes from 10 to 3,000 pounds.

In winter 1995, after a fire badly damaged the toll processor's plant, management had to choose between rebuilding options. One option was to rebuild the processing line and use the best system possible for the existing limited space. A more expensive option was to start fresh and build a new plant in the neighboring

city, Donora. This would allow room to expand as operations grew. Many of Therm-O-Rock's employees live near Donora, adding to its appeal. Therm-O-Rock owner Ed Dobkin decided to rebuild the plant in Donora and maintain some operations in New Eagle.

Processor considers gravimetric and volumetric feeding

The processor had to act quickly to get operations back on track, so they hired an engineering consultant to specify the new handling and blending system for the plant. The system included the means to store, convey, screen, feed, blend and package materials. The plan was completed, and Dobkin contacted equipment vendors to supply the specified equipment. When it came time to select a loss-in-weight (gravimetric) feeder and weighbelt conveyor, the processor chose a manufacturer whose equipment had performed well at Therm-O-Rock's original plant.

Even though the manufacturer makes gravimetric equipment, they disagreed



Three 6-inch-diameter volumetric screw feeders beneath the hoppers meter material to a 10-inch-diameter vibratory tube conveyor.

with the consultant's recommendation and believed that simpler, less expensive volumetric feeders would meet the processor's needs. A processing line with gravimetric feeders requires much more construction work and peripheral equipment, including refill hoppers, valves, load cells and controls. With additional sophisticated equipment come more operator training, operating expenses and potential service needs and downtime. Dobkin wanted to keep the new processing line simple, as long as it could do the job. "In the military they have the KIS principle - Keep It Simple," he says. "We wanted to put together a system that had quality, gave the output we needed and was low maintenance. The whistles and bells are nice, but the more you have, the more maintenance and room for error if something goes wrong."

The equipment manufacturer then invited Dobkin and the plant quality control manager to its test center to view tests on the volumetric feeder and a scaled-down version of the whole proposed handling and blending system.

"We took raw materials to Vibra Screw and ran them through the system the way we would make the finished product," Dobkin says. The feeder and the other equipment handled the material well. "Then we brought the finished material back to our lab for quality control tests. We even submitted the fin-

ished products to some customers so they could run quality control checks. The material passed the inspections, so we knew we were on the right track."

Even though the tests were successful, Dobkin had concerns about the volumetric feeders' capabilities. "We wanted to guarantee that at our high processing speeds, we wouldn't produce a lot of off-spec material," he says. This could happen if material bridged in the feeder bins and didn't feed. Dobkin eliminated that concern by preparing to use bin level indicators and flow-aid devices.

After dealing with these concerns, Dobkin was ready to make a decision. "I looked at [both feeders'] costs and our final product needs. I could more than meet the product parameters with the volumetric feeder," he says. The gravimetric feeder and all of its associated equipment wouldn't be necessary.

The feeder chosen was the Vibra Screw VersiFeeder volumetric screw feeder. The modular vibratory feeder handles a broad range of materials, including powders, pellets, flakes and fibers, and is rated at ± 1 to ± 2 percent accuracy for any material. The feed tube is horizontal with an end or vertical discharge. Wire screws or flighted screws are available. Material contact surfaces are available in carbon steel and Type 304 or 316 stainless steel.

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A continuous vibratory blender (top) discharges to a scalping screener (center).

Manufacturer takes over project

After Vibra Screw showed Dobkin how the volumetric feeder could handle the job, Dobkin asked them to take charge of the entire project. They started from scratch and laid out the new plant from the foundation up and installed two complete lines from silos to packaging equipment.

"Whatever difficulties arose, they were right there. They've been a tremendous supplier."

Therm-O-Rock's new plant was built and the processing equipment was installed by November 1996. "We were up and running by January, so it really wasn't a long shakedown period," says Dobkin. During this period, problems were traced to such things as undersized fuses and transformers, and in one case, complete failure of a line component—a vibratory tube conveyor. "Those were some of the typical, minor difficulties of getting up and running, but by January's end things were going pretty smooth."

Two identical packaging lines were installed. Each line starts with 12-foot-diameter, 3,000-cubic-foot storage silos. A 5-foot-diameter bin activator helps each silo discharge material to a scalping screener. From each screener, a 15-foot-long, 10-inch-diameter screw conveyor carries the material to a continuous vibratory blender. The blender mixes materials at up to 1,200 cu ft/h.

Three bulk bag unloaders for specialty ingredients also supply material to the blender. Each unloader has an on-board trolley and hoist to ease bag handling. Each unloader dispenses material to a 50-cubic-foot hopper that stores and discharges material to a 6-inch-diameter volumetric screw feeder.

All three screw feeders meter material to a single 10-inch-diameter vibratory tube conveyor. The tube conveyor then feeds the material to the blender, which discharges to a scalping screener. The screener supplies a screw conveyor and bucket elevator that transport the blended material to a 200-cubic-foot, live-bot-

tom bin to ensure the material doesn't pack. A diverter valve below the bin supplies two smaller live-bottom bins that discharge the material to the two packaging lines.

The blending operation is continuous, so the equipment can't stop for steps such as hopper refilling. All processing equipment must be synchronized. This is accomplished with a PLC custom built by the equipment manufacturer. The PLC handles equipment sequencing and safety interlocks. A PLC modem link lets Vibra Screw remotely troubleshoot the Therm-O-Rock operation.

Therm-O-Rock's new plant has been shipping product for just over a year, and Dobkin knows he made the right decision. "Production has been going very well," he says. The system is efficient and works as planned. Dobkin also says he's very satisfied with Vibra Screw. "Whatever difficulties arose, they were right there. They've been a tremendous supplier."



A live-bottom bin supplies packaging equipment.

Dobkin says Therm-O-Rock "is always looking for future growth potential. But there are no immediate plans. This project was a major investment for a company our size. So right now we're just catching our breath."

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