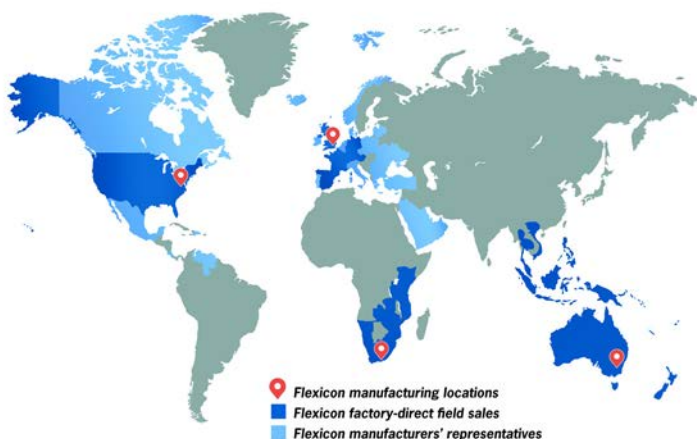


TECHNICAL ARTICLE SERIES

Y-0600

APCO Packaging Moves Perlite in Low Headroom Area with Flexible Screw Conveyor



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APCO Packaging Moves Perlite in Low Headroom Area with Flexible Screw Conveyor

BRIDGEVIEW, ILLINOIS — APCO Packaging, a leading contract packager with expertise in difficult-to-handle materials, recently signed a contract with a customer to blend and package expanded perlite, an amorphous powder used to clean up environmentally hazardous spills.

"Our customer had a tight deadline for introduction of the product and we have a policy of guaranteed on-time delivery of difficult-to-handle materials with fast turnaround times," says Greg Hinton, President of APCO. "It seemed like an ideal fit."

Challenges quickly arose, however, when APCO learned that the material, which would be delivered to its facility in bulk bags 6 ft (1.8 m) high and 540 lb (245 kg), would be more problematic to handle than they had anticipated. "Using an overhead crane to empty the bulk bags directly into the packaging equipment would have required a ceiling height of 28 ft (8.5 m), but our ceilings are only 26 ft (7.9 m) high," says Hinton. "Installation of such a system would have required going through not only the ceiling, but also the roof. We needed a better solution."

For a number of years, APCO has employed bulk bag dischargers, hoppers and flexible screw conveyors for powder handling in its repackaging of industrial, household and personal care products. As an example, three bulk bag dischargers and flexible screw conveyors transfer heavy powders such as powdered metals and special formulations based on soda ash (sodium carbonate). "We repackage four different powdered metals with bulk densities ranging from 80 to 120 lb/cu ft (1,281 to 1,922 kg/cu m)," says Hinton.

APCO also dedicates other flexible screw conveyors for packaging single products that it continually runs for particular customers.

For the perlite job, the packager turned to Flexicon to "custom engineer a flexible screw conveyor that met our height requirements," says Hinton, "and deliver it in only two weeks — in time for us to begin supplying product to our customer by the contracted date."

Perlite poses special handling problems

Perlite is an amorphous volcanic glass with a relatively high water content produced when lava from a volcano cools rapidly without forming crystals. It occurs naturally and has the unusual property of greatly expanding when heated to temperatures of 1,562°-1,652°F (850°-900°C). Water trapped in the structure of the material vaporizes and escapes, causing expansion to 7-16 times its original volume. The expanded material is a brilliant white, due to the reflectivity of the trapped bubbles, with a bulk density of only 10 lb/cu ft (160 kg/cu m). Because of its excellent absorption properties, it is often used to clean up liquid spills but its light weight and flaky structure can cause it to cling to solid surfaces by static electricity, making it difficult to handle.

"We supplied samples of the blended material, and Flexicon custom designed a special screw to accommodate its special characteristics," says Hinton. "Because the material is so light and fluffy, particles can easily become airborne so we need to keep the material contained, especially as a



Blended perlite mixture discharges from bulk bag into the 8 cu ft (0.23 cu m) capacity stainless steel hopper (top), as the 30 ft (9.1 m) long flexible screw conveyor moves the material to the surge hopper above the packaging machine (above).

pneumatic turbine vibrator in the hopper agitates the particles to prevent them from adhering to its interior walls because of static electricity."

Flexible screw conveyor surmounts height restriction

The perlite transfer system consists of an 8 cu ft (0.23 cu m) capacity stainless steel hopper measuring 36 in. (91.4 cm) square by 38 in. (96.5 cm) high, and a 30 ft (9.1 m) long flexible screw conveyor that transports the perlite mixture to the intake of the packaging machine's hopper at a height of 22 ft (6.7 m). Because the flexible screw conveyor can move material at any angle, it was inclined to fit within the company's ceiling height of 26 ft (7.9 m). The conveyor consists of a specially designed, flexible helix rotating within a flexible 4.5 in. (11.4 cm) O.D. polymer tube, powered by an electric motor at the discharge end.

Perlite moves from bulk bags to re-sealable bags

A forklift operator unloads a bulk bag of perlite into an enclosed ribbon blender located on a platform 9 ft (2.7 m) above the plant floor. The material gravity feeds into the blender as the operator unties the bag spout after clamping it to the blender's inlet tube. A small amount of a proprietary performance-enhancing additive, which changes the bulk density of the perlite, is then added. After blending, the inlet of the original bulk bag is fastened below the ribbon blender for the material to gravity feed into it.

The forklift operator then positions the bag above the hopper of the flexible screw conveyor. He clamps the spout to an inlet tube in the hopper lid and unties the spout, allowing material to gravity discharge. The flexible screw conveyor transports the material to the ceiling-high hopper above the packaging machine, which is equipped with high- and low-level sensors that turn the conveyor on and off to maintain an adequate volume of material in the hopper while 1 lb (454g) re-sealable bags are being filled.

As mentioned, APCO packages many materials using flexible screw conveyors and hoppers. To prevent cross contamination between product runs, an operator removes the clean-out cap covering the intake end of the plastic tube to permit rapid emptying and pressure cleaning of the tube, as well as disassembly and cleaning of components and stainless steel screw.

APCO worked with to secure the conveyor through the conveyor manufacturer's Quick-Ship program. "It took only two weeks from the time I called until the system was up and running," said Hinton. "We were filling bags with the blended perlite material and sending them to our customer in less than three weeks."



A flexible screw conveyor proved the best way to move the perlite mixture to a ceiling-high surge hopper above the packaging machine.



Material discharges from the conveyor tube through a transition adapter into the surge hopper.



APCO Packaging employs bulk bag dischargers and flexible screw conveyors in repackaging various industrial, household and personal care products. This BULK-OUT® BFC discharger from Flexicon features a cantilevered I-beam with electric hoist and trolley.



Perlite's light weight and fluffy characteristics make it a difficult material to handle.