Getting Into LSR
Part II: Choosing an Injection Machine

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Bag-Dump System Cuts TiO₂ Dust in PVC Blending

For PVC processors, containing dust when using titanium dioxide (TiO₂) is an age-old problem. It's one that Ameron International, Brea, Calif., an extruder of PVC protective linings for large concrete sewer pipes, had to put up with until it switched to a system from Flexicon Corp., Bethlehem, Pa. (flexicon.com), consisting of a bag-dump station with an integral flexible-screw conveyor.

With Ameron's previous mixing process, plant personnel simply cut open bags of TiO₂, which has a bulk density of 45 lb/ft³, and shoveled the powder into a bucket on a scale. When the net weight of TiO₂ reached 6 lb, it was dumped into a blender containing 300 lb of PVC. Not surprisingly, the process produced dust.

Now, 25-lb pallets of TiO₂ are stacked next to the bag-dump station on an elevated dock. The station is equipped with a waist-high bag-tray support that provides a work surface for operators to stage, clean, and open bags prior to dumping. The bag-dump station's dust collector is mounted directly on the 5.5-ft³ (0.16-m³) floor hopper. The operator opens the hopper lid, activating a high-velocity vacuum fan, and dumps TiO₂ through a screen that keeps foreign objects out of the system. The fan draws airborne dust onto two filter cartridges rated at 99.99% collection efficiency for particle sizes of 1 micron or less.

At the same time, an automatic reverse-pulse filter-cleaning system employs timer-activated solenoid valves to direct short blasts of compressed plant air at the cartridge filters, causing dust buildup on the outer filter surfaces to fall into the hopper.

Measuring 30 in. square x 44 in. high, the hopper is a "high-flow" configuration that causes TiO₂ to topple and flow toward and down the unit's steep back wall, activating solenoid valves to direct short blasts of compressed plant air at the cartridge filters, causing dust buildup on the outer filter surfaces to fall into the hopper.

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preventing the powder from bridging between the sidewalls.

The hopper directs powder into the intake adapter of a 25-ft-long, 2.625-in.-diam. flexible screw conveyor inclined at 45°. A 2-hp electric motor at the discharge end of the conveyor rotates a screw specially designed for the hard-to-move powder, propelling TiO₂ through the plastic tube and a discharge spout connected to a 4-ft-long, 6-in.-diam., wire-reinforced PVC downspout. The powder falls into a bucket enclosed in a dust-containment box, which sits on an electronic scale above the blender.

When the blender calls for TiO₂, an operator activates the conveyor, as well as the vibrator and agitator in the hopper. The controller automatically stops the conveyor when the weight of material in the bucket reaches 5.5 lb. Remaining powder in the downspouting trickles into the bucket, bringing the final weight close to the required 6 lb. “We’re achieving batch-weight accuracy of approximately ±0.02 lb, which is many times more accurate than the old system,” reports James Gross, product engineer at the Ameron plant.

Gross’s initial estimates allowed up to 3 minutes to deposit the required 6 lb, given the variable flow characteristics of TiO₂, but the task is now accomplished in 30 to 45 seconds. And since an operator can empty the filled bucket into the blender without

removing it from the dust-containment box, TiO₂ is contained throughout the system, says Gross.  

By James J. Callari, Editorial Director

A 25-ft-long flexible screw conveyor transports titanium dioxide to the mixer on the mezzanine. The conveyor has a flexible screw with specialized geometry for moving the non-free-flowing material.

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