

Half time

US company minimises manual handling with an automated weigh batching system, designed and installed by Flexicon (Europe)

Polymeric Systems is a US based company producing epoxy mastics, but efficiency and health and safety limitations, imposed through the manual handling system on the process line, demanded a review in production methods. It was essential to eliminate these disadvantages and after lengthy consultation with bulk solids handling specialists Flexicon Corporation a simulated, automated weigh batching system was designed and proven in Flexicon's test laboratory using the company's actual material, verifying system performance prior to fabrication.

The system comprises three bulk bag dischargers, each equipped with a 225l capacity receiving hopper and 3m or 4.5m long, 114mm diameter screw conveyor and a control panel. Each flexible screw conveyor consists of a durable plastic outer tube enclosing a model 1450 conveyor spiral, specially designed to accommodate the highly aeratable, inorganic powder. Flexicon applications engineers also incorporated several design elements to overcome the challenges associated with handling the powder.

This process line claims to have effectively cut batching time by half (three hours down to 1.5 hours) and reduced potential manual handling related injuries to a minimum. Previously, operators dumped 28kg sacks of dry inorganic powder, up to 32 bags per batch, into a 950l kneader-extruder or one of two 380l kneader-extruders. Today, the three bulk bag dischargers unload powder from 1135kg bulk bags as the flexible screw conveyors transfer the material in pre-selected batch weights to any of three kneader-extruders, under loss-in-weight control.

60 SECOND BATCH WEIGHT RECIPES

Because sack weights fluctuated by up to 2.25kg, operators weighed each sack and adjusted for variations. Now, adjusting a batch weight or selecting one of Polymeric's nine epoxy mastic recipes requires a one-minute entry on the control panel. The operator is freed for other tasks rather than being tied to the batching process.

The only manual task involves adding small amounts of minor fillers from 28kg bags into the hopper, which is equipped with a bag tray support and hinged cover.

ACCURATE WEIGHT

A control panel entry initiates unloading of the bulk bag and conveying of powder in precisely weighed batches to the kneader-extruder. As a bag empties, load cells supporting the discharger frame transmit weight-loss signals to the controller, which steps down the conveyor to a dribble feed rate immediately prior to stopping the conveyor once the accurate batch weight has been unloaded. Batches between 180-720kg are accurate to 0.9kg.

FLOW PROMOTION

Flow promotion devices integral to the bulk bag discharger frame promote a continuous flow of material into and through the bag discharge spout. A manual spout-lock clamp ring mounted above a tele-tube telescoping tube creates a sealed connection between the clean side of the bag outlet spout and the clean side of the telescoping tube. As the bag empties and elongates, the telescoping tube keeps the spout taut at all times by maintaining constant downward tension, preventing excess spout material from bulging outward (creating dead pockets) or falling inward (creating flow restrictions).



Flow-flexer bag activators raise and lower opposite bottom edges of the bulk bag at timed intervals, promoting material flow into the bag discharge spout. As the bag lightens, the stroke of the bag activators increases, raising the bag into a steep V shape for total evacuation of material. A pneumatic, turbine vibrator in the hopper promotes the flow of powder into the flexible screw conveyor's charging adaptor.

For leak-proof retying of partially empty bags, a power-cincher flow control valve employs a series of curved, articulated, stainless steel rods that cinch the spout concentrically on a horizontal axis and vertically in a tight zig-zag pattern, preventing leakage of the finest powders.

PREVENTING CONTAMINATION

The dry, inorganic powder remains fully enclosed as it travels throughout the sealed system of interconnected equipment comprising the bulk bag discharger, hopper, flexible screw conveyor and kneader-extruder, preventing contamination of the product and plant environment. Previous bag dumping in open air created dust and allowed paper scraps to enter the batch.

The system enables polymeric systems to switch to different products rapidly, meeting the needs of customers in the OEM, DIY and retail markets and is expected to pay for itself in less than two years.

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ABOVE: one of three flexible bulk bag weigh batch unloading systems equipped with a 225l capacity receiving hopper and 114mm diameter flexible screw conveyor, discharges powder from 1135kg bulk bags, transporting it under loss-in-weight control to any of three kneader-extruders. A bag tray support and hinged hopper cover allow manual additions of minor ingredients.

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