

Bag Switch Achieves Precise Batch Weights

Nutec Ltd, a contract manufacturer and packager of animal feed and medicinal products, in Staffordshire, England, converted from manual dumping of 20 kg bags of raw material to automated, dust-free discharging of 1 tonne bulk bags using a bulk bag weigh batch discharger.

Previously, pallets of bags containing the raw material were forklifted onto a 3 m high mezzanine, adjacent to a receiving hopper into which the bags were emptied. A 150 mm diameter Flexicon flexible screw conveyor transported the material 4.5 m to a 2 tonne capacity blender.

Because bags varied by up to 0.1 kg, the quantity of additive fed to the blender was adjusted by a controller receiving weight gain signals from load cells that supported the blender. The blended compound was then conveyed for packaging into 10-25 kg bags.

Components of product transfer system

The new system, capable of transferring 12 tonnes per day of material supplied in bulk bags, comprises:

- Bulk bag discharger frame;
- 0.2 m³ capacity hopper;
- 2 m long, 100 mm diameter flexible screw conveyor housed in a UHMW polyethylene tube;
- 0.8 m³ capacity transfer bin, free standing on a platform scale;
- Dust collection system;
- Control panel for gain-in-weight weighing of raw material.

Dust-tight connection at bag/hopper interface

The straps of a 1 tonne bulk bag are hooked to a lifting frame that is raised by forklift and set into receiver cups comprising the top of each discharger post.

The bulk bag/hopper interface consists of a manual Spout-Lock clamp ring positioned above a pneumatically actuated Tele-Tube telescoping tube, which facilitates dust-tight connections between the bag spout and hopper, and automatically elongates the bag as it empties to promote flow and evacuation.

The telescoping tube pneumatically raises



Fully enclosed system, comprised of bulk bag discharger, receiving hopper, flexible screw conveyor, and transfer bin, dramatically reduces operator exposure to airborne dust.



Spout-Lock clamp ring and pneumatically actuated Tele-Tube telescoping tube allow dust-tight connections between bag spout and hopper, and automatic elongation of the bag as it empties for total evacuation of material.



The transfer bin is mounted on a platform scale, which transmits gain-in-weight signals to a controller that runs, slows, and stops the conveyor, achieving rapid batching cycles and $\pm 0.04\%$ batch weight accuracy.

the clamp ring assembly allowing connection to the bulk bag spout, sealing the clean side of the bag spout to the clean side of the telescoping tube. It then lowers until the bag spout is pulled taut. Once the spout is untied, the telescoping assembly exerts continual downward tension on the spout, elongating the bag as it empties.

The dust-tight seal between bag spout and clamp ring allows full-open discharge from the bag with no dusting.

Air and dust in the hopper displaced by bulk material discharging from the bag are fully contained by a remote dust collection unit. From the receiving hopper, material gravity feeds into the intake adapter of the 100 mm diameter, 2 m long flexible screw conveyor and is conveyed at a 45° incline for discharge into the 0.8 m³ capacity transfer bin.

Gain-in-weight control achieves batch accuracy

The bin is mounted on a platform scale that transmits gain-in-weight data to a controller.

When the operator initiates a cycle, the first setpoint runs the conveyor at high feed rate for rapid fill. Immediately prior to reaching the target batch weight, the second setpoint reduces the feed rate to dribble speed, stopping the conveyor when the precise batch weight of 400 kg has been achieved within ± 200 gm.

A forklift truck lifts the bin to the 3 m mezzanine, lowering it onto the hopper. A manually opened butterfly valve allows raw material to drop through the hopper into a flexible screw conveyor that feeds batches of precise weights into a blender where it is compounded with an additive.

To clean the flexible screw conveyors, an operator removes the outer tube screw cap and reverses the drive, evacuating any residual material prior to thorough flushing of the unit's crevice-free interior surfaces using a cleaning solution.

Fitting into a small, available space, the system enabled a major changeover in production techniques with minimal disruption. In addition to reducing labour, it eliminated the need for bag disposal and dramatically reduced operator exposure to airborne dust. ■

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