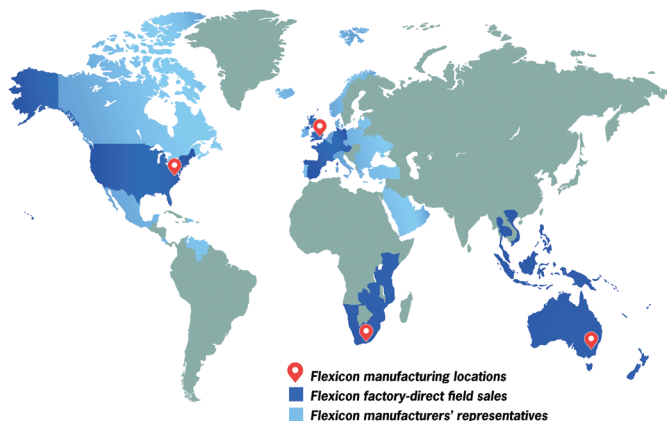




Automated Line Improves Sanitary Filling of Bulk Bags With Coffee Creamer Powder

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Automated Line Improves Sanitary Filling of Bulk Bags With Coffee Creamer Powder

REPOROHA, NEW ZEALAND — Anchor Products' new, automated packing line for filling bulk bags with sodium caseinate eliminates aeration experienced with a rotary sack filler, and cuts dust and packaging waste by 90%, while achieving bag weight accuracy of 1 percent.

The powder is automatically transferred and filled by a system comprised of two flexible screw conveyors, a 1500 liter (390 gal) capacity surge hopper, and a bulk bag filler. The 1500-lb bags are automatically conveyed from the filler to a heat sealer, then to bulk storage. The PLC-controlled system ties to the plant PLC.

Anchor Products, the largest business unit of the New Zealand Dairy Group, packs the sodium caseinate powder for export to a customer in Korea for use in manufacture of coffee creamer.

Anchor selected flexible screw conveyors as the most effective method to move this difficult-to-convey powder in a restricted 33 x 23 ft space.

Overcoming Aeration

Flexible screw conveyors provided the means to overcome the semi-free flowing powder's tendency to aerate. (Bulk density is 26 lb/cu ft, angle of repose 45°-60°.) The flexible screw conveyors lie at a 20° angle, which combats aeration by imparting less energy into the powder than would occur at a higher angle. The screw is a wide, flat spiral, which presents a wider carrying surface than the typical round-wire screw. The flat screw applies a positive forward force while reducing the radial force against the outer tube's walls.

Anchor rejected pneumatic conveying, which needs a deaeration station. "A separator would reduce packing time and increase fines losses," says Keith Mason, former site services manager who oversaw the installation.

The flexible screw conveyors transport the material through a 6-5/8-in diameter UHMW polyethylene outer tube enclosing a rugged, flexible stainless steel screw, driven by a low-power electric motor. As the flexible screw rotates in the tube, it self-centers, providing clearance between the screw and the tube wall, and creating a gentle rolling action that prevents degrading of the powder, which would occur in a separator.

"Because we pack large quantities, we couldn't allow any air to mix with the powder," Mason continues. The bulk bag filler's PLC-controlled vibratory densification/deaeration bed removes air, and stabilizes and settles the material.



How System Works

The sodium caseinate powder enters the packing room from the blending area after being spray dried and milled to the correct particle size and transferred to a packing bin in a weighed batch depending on the order requirement.

At the control panel outside the packing room, the operator directs the powder either to the 4-station rotary packing machine to fill 44- or 55-lb (20-25kg) multi-wall sacks or to the Flexicon bulk bag filler.

The first 25-ft long flexible screw conveyor transports the powder from the packing bin at a 20° angle to a height of 4 ft. The powder falls through a transition discharge adapter and metal detector to the surge hopper, which extends through the floor to the lower level. The PLC turns the flexible conveyor on and off to maintain a set level of material in the hopper.

The second 10-ft long flexible screw conveyor, supported from the surge hopper, carries the powder at a 20° angle to the automated bulk bag filler. The operator selects the filling sequence, and the bulk bag automatically fills to the preset weight. The bulk bag filler frame is mounted on four load cells that transmit gain-in-weight information to the PLC proportional to the load of the bag and filler. The PLC slows the flexible screw conveyor's variable speed motor to dribble feed rate immediately prior to stopping the conveyor once the target weight is reached, achieving accuracy of ± 2 lb.

The flexible conveyors transfer the powder intermittently: 5 minutes on, one minute off. Packing rate is 7 tons/hour.

An inflatable connector seals the bag spout to eliminate dust. The fill head's dust collection port connects to the plant dust collection system. Mason says, "Previously we were recovering upwards of 0.05% dust per day while packing 20-kg bags. This has dropped to 0.005%."

Filled Bag Is Automatically Conveyed

Pneumatically actuated bag strap hooks automatically release the filled bag. The PLC instructs the printer to print labels for insertion in each bag. Labels contain date, product, weight and other data for traceability and stock control. A flat-belt conveyor transfers the filled bulk bag from the filler, while a second conveyor positions the bag under a heat sealer, which seals the bulk bag liner to ensure quality of product delivered to the customer. The bag continues out of the room on the conveyor to the stacking gantry, where the bag is weighed, placed on a pallet and moved into bulk storage for stacking.

To meet New Zealand Dairy Board Standard NZCP6, the packing line equipment is constructed of food grade materials, including UHMW polyethylene for the conveyors and type 304 stainless steel with interior welds ground and polished to a sanitary finish.

Expands Market Opportunities

Other customers have expressed interest in receiving Anchor's sodium/calcium caseinate and total milk protein products by bulk bag. "We had to allow for packing these products on the same line," Mason says. The bulk bag filler accommodates variable bag sizes between 350-900 kg (770 to 2000 lb). A linear actuator raises and lowers the filling head for various bag sizes.

"The customer is very pleased with the packing line's performance," says Site Manager Gerard Gunnell.



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