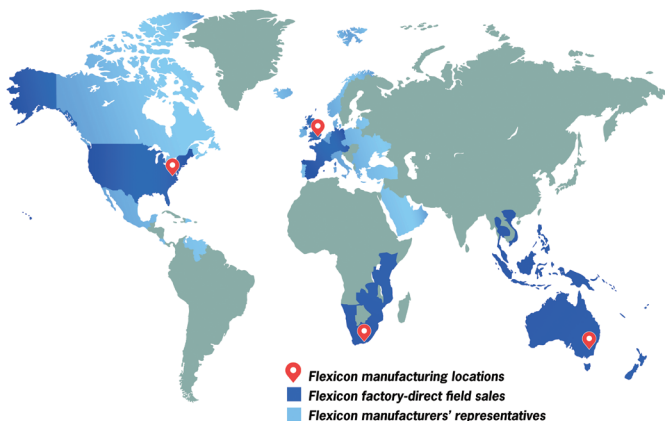




Bulk bag dischargers unload salt (L) and whey (R) from 2200 lb (1000 kg) bags into hoppers equipped with flexible screw conveyors that transport the material to the sanitary room.

Automated Bulk Bag Weigh Batching of Salt and Whey Replaces Manual Bag Dumping, Boosts Margarine Production 50%

P-1006



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Automated Bulk Bag Weigh Batching of Salt and Whey Replaces Manual Bag Dumping, Boosts Margarine Production 50%

LETHBRIDGE, ALBERTA — Manual operations give way to automated milk preparation for margarine blending in a new sanitary process room at Canbra Foods, Inc. Automated controls improve quality as supervisors monitor and identify trends, and pinpoint process deviations quickly. The safety of workers is improved while their responsibilities are expanded. The company saves \$45,000 (Canadian) yearly by purchasing ingredients in bulk bags instead of 15 and 20 kg (33 and 44 lb) bags.

An operator's command at a central PC initiates addition of a pre-selected weight of salt and whey powder from 1000 kg (2200 lb) bulk bags from two bulk bag dischargers, through two flexible screw conveyors to one of two mixing tanks inside the room. Agitators in the tanks automatically cycle on and off. Pumps admit the precise volume of water, while other pumps transfer the precise volume of prepared milk through a heat treating process to a finished milk tank. The ingredients remain enclosed from bulk bag to mixing tank, precluding contamination.



Flexible screw conveyors elevate salt and whey to a height of 30 ft (9m), they are gravity fed through two diverter valves into the sanitary room.

Automated Batching of Salt and Whey Powder

Key to batching of the salt and whey powder is an automated process jointly engineered by Canbra Foods and Flexicon Corporation. Outside of the room, each of two 15 ft (4.5 m) high bulk bag dischargers, under loss-of-weight control, unloads whey powder or salt into two 8 cu ft (0.22 cu m) capacity stainless steel hoppers. From each, a 30 ft (9 m) long flexible screw conveyor elevates the ingredient to a height sufficient for gravity feeding through two 5 ft (1.5 m) high wye-diverter valves. Inside of the room, each valve splits into two 8 ft (2.4 m) long stainless steel chutes feeding either of two 10.5 ft (3.15 m) high mixing tanks.

The bulk bag dischargers suppress dust by means of a 12 in. (31 cm) diameter iris flow control valve with a flexible, impermeable diaphragm that allows the operator to pull the tied bulk bag spout into the spout access compartment and close the valve around the spout. The spout is then untied, the compartment's access door closed, and the notched valve released slowly, controlling the rate at which the powder discharges into the hopper to prevent dust from escaping.

Pneumatically activated FLOW-FLEXER® plates at the bottom of the bag promote flow of the ingredient by massaging the lower side walls of the bag at pre-set intervals. As the bag empties, the stroke of the plates increases, raising the side walls in a "V" shape, promoting complete product discharge. A pneumatic turbine vibrator in the hopper promotes flow into the flexible screw conveyor intake adapter.



Diverter valves direct salt and whey to either of two raw milk tanks in the sanitary room.

Operates with Plant Control System

As a bag discharges, load cells supporting the entire frame and bag transmit weight-loss signals to a controller, which shuts off the flexible screw conveyor once the set batch weight has been discharged. The controller passes information to and from the plant SCADA system at a central PC, which also communicates with the PLC controlling the agitators and pumps inside the room, as well as 13 other PLC's in the plant. At the central PC, an operator enters commands for the milk preparation through RSBatch software, under the ISA S88 batching standard. The software collects data for tracking each batch, compiling batch records, and identifying trends and deviations.



Each diverter valve can direct the salt or whey through drop chutes to either of two raw milk tanks.

Meets Sanitary Standards

Product contact surfaces of the flexible screw conveyors are constructed and finished to sanitary standards. Each conveyor moves the ingredient through an outer tube that encloses a rugged, flexible stainless steel screw—the only moving part contacting material. The conveyor has no cracks, crevices that can trap particles or prevent thorough cleaning. For cleaning, the operator removes the cleanout cap and reverses screw rotation to evacuate any residual material.

A stainless steel flat wire spiral, imparting greater directional force than round wire spirals, conveys the fine (200-mesh particle size), semi-free-flowing whey powder. A round stainless steel screw transports the 40-mesh particle size salt. Both ingredients are hygroscopic.

Replaces Manual Operation

The automated batching system replaces manual dumping of 15 and 20 kg (33 and 44 lb) bags of the ingredients into a pre-mixer on an open processing floor. The plant needed to dispose of 100 empty bags per day. Inevitably, spillage occurred, and the pre-mixer occasionally received inaccurate amounts of ingredients. The potential arose for injury from lifting bags. Manual operations also included activating the mixer and pumps and recording data, subjecting the process to human error.

To produce margarine, the prepared milk is blended with canola oil, Canbra Foods' main product. The oil preparation phase, also under the plant PLC control system, is largely automated, but Canbra Foods may upgrade it in several years, utilizing a similar loss-of-weight bulk bag batching system for wet and dry blending of ingredients.

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