Flexible screw conveyors from Flexicon are being used by World Flavors to convey spice blends to packaging machines without segregation or contamination

World Flavors Co Inc, based in the US, blends and packages a variety of seasonings, powdered coffee and drink mixes. The process requires equipment that can prevent segregation of blended products and be sanitised quickly and thoroughly between changeovers, preventing cross-contamination.

In addition, the company needs to handle large runs of particular products, for example, 5.4 million kg/year of dry cappuccino, as well as meeting increased capacity requirements prior to holidays. In flavoured coffee drinks alone, that equates to repeated blending of 3,360kg batches.

World Flavors’ packaging manager, Russ Perry, who has been with the company since 1987, recalls the days before the company installed flexible screw conveyors; the days when material was scooped manually into the filling machine hoppers.

The company now runs eight flexible screw conveyors, each 4.6m in length and 114mm in diameter. Manufactured by Flexicon Corporation, the conveyors consist of a polymer tube that encloses a flexible stainless steel screw driven by an electric motor. As it rotates and self-centres, the screw propels material through the tube, providing sufficient clearance between the screw and the tube wall to eliminate or minimise product degradation. World Flavors standardised on the Model 1450 conveyor so spare parts could be swapped out and used across all the lines.

Three of the conveyors run on lines dedicated to cappuccino mix but at the height of the season, they run the cappuccino on six lines. The other conveyors run a variety of spice blends throughout the year, ranging from sausage patty flavourings and spice blends for sweet potatoes to pumpkin pie spice blends and individual spices such as cinnamon and vanilla.

When the hopper is full the operator activates the flexible screw conveyor, conveying the material through 45° to an elevation of 3.7m, at a rate of 4.1m³/hr, for discharge into the packaging machine. High and low level sensors in the packaging machine signal a controller to stop or restart the rotation of the flexible screw when the machine calls for material.

Preventing separation

As a purveyor of many blended products, World Flavors is diligent in preventing the separation of blended products, often comprised of disparate particle sizes and shapes, as they move from blending to packaging. Perry says: “The gentle rolling action of the inner screw moves blends with no separation throughout the entire length of the conveyor.”

Following formulas developed by World Flavors’ R&D, workers combine ingredients and then load each batch into one of seven blenders according to batch weight. Small batches weigh up to 135kg, medium batches up to 635kg and large batches up to 3,635kg. Uniform blends are discharged from blenders into plastic 965 x 965mm totes that hold 725kg of the mix. After passing quality control, workers move the totes to a holding area.

When a production run is readied on one of the eight packaging lines, a forklift operator sets a tote on top of a 230 litre capacity hopper from which a 4.6m flexible screw conveyor transports blends to a packaging machine.

When the time comes for complete sanitising, plant personnel disconnect the screw and tube from the hopper and motor drive and move the conveyor to the cleaning area where they remove the screw from the tube, allowing thorough washdown. According to Perry, if a hot, Italian seasoning blend for sausages preceded a cappuccino mix, they would disassemble the conveyor, pressure wash and dry everything, reassemble the components and start running the next flavour within about 20 minutes.

The washdown procedure

The company performs a washdown procedure between a certain number of runs, depending on the flavours conveyed that day. The quick-disconnect feature of the conveyor allows operators to quickly release it from the line and roll it to a dedicated area for a pressure wash between runs. The removable, clean-out cap at the intake end of the conveyor tube enables reversing screw rotation for emptying and flushing of the tube, as well as disassembly and washdown of components.

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