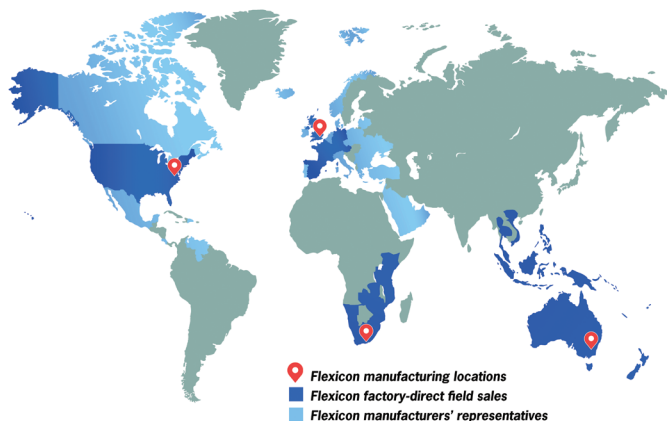




Large Scale Bulk Handling Project Boosts Gluten-Free Food Production at Bakery On Main

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EAST HARTFORD, CONNECTICUT — Gluten is a protein found in wheat, rye, barley and their crossbred varieties and derivatives. In baking, gluten is the binding agent within flour that prevents baked goods from crumbling. Gluten-free, once considered a fad, is now becoming mainstream with more than 15% of North American households eating gluten-free foods. As a result, the market for gluten free foods has doubled within the past five years and is now estimated to be approximately \$5.5 billion.

To meet this growing demand, Bakery On Main, a commercial bakery specializing in gluten-free foods, needed to significantly increase its capacity. “We were operating at 100 percent of capacity. Our bulk handling equipment, which consisted largely of inclined conveyor belts, was inefficient and very labor intensive,” says Michael Smulders, owner of Bakery On Main. “It was also an open system, so ingredients were exposed to the atmosphere.”

After investigating various ways to upgrade the existing equipment, all of which proved unsatisfactory, Smulders decided to build an entirely new facility with an integrated bulk handling system designed specifically for gluten-free baked goods. He commissioned an independent engineering firm to handle the overall design. The firm worked closely with the Project Engineering Division of Flexicon Corporation, Bethlehem, PA, to create a fully integrated system based on the company’s FLEXI-DISC® Tubular Cable Conveyor (TCC) system.

Tubular Cable Conveyor principle of operation

Inside the TCC system, a series of low-friction polymer discs attached to a stainless steel cable gently slide bulk materials through smooth stainless steel tubing. Because of its gentle conveying action and dust-tight operation, a TCC system is ideally suited for transfer of fragile, contamination-sensitive food products.

The stainless steel tubing can be positioned horizontally, vertically or at any angle. Because the system is modular, inlets and outlets can be added as needed to control the flow of material. The system can also be lengthened or shortened to fit the available space.

Regardless of configuration, the low-friction polymer discs and cable are driven by a rotating wheel at one end of the circuit, and maintained under tension by a wheel at the other end.

Two integrated systems produce granola and oatmeal

Bakery On Main offers five flavors of gluten-free granola including Cranberry Orange Cashew and Rainforest Banana Nut. The bakery also offers six flavors of instant oatmeal, including Blueberry Scone and Maple Walnut Muffin.



Granola tubular cable conveyor circuit: Minor ingredients are manually added through hopper at right while major ingredients are metered from two bulk bag dischargers into the tubular cable conveyor that feeds the mixer (background).



Minor granola ingredients are manually added to a hopper which discharges through a metered inlet adapter into the TCC line.



The new building spans 110,000 sq ft (10,200 sq m) and has 20 ft (6.1 m) ceilings. Because granola and oatmeal each require a different production process, Bakery On Main operates two separate bulk handling systems from Flexicon within the new building.

System integration permits fully automated granola production

The granola handling system includes two FLEXI-DISC TCC circuits, a TIP-TITE® Box Dump Station, a TWIN-CENTERPOST™ Bulk Bag Filler and two BULK-OUT® Bulk Bag Dischargers.

The major granola ingredients are discharged from an extruder into the Bulk Bag Filler, which is equipped with an inflatable seal and a high level sensor and indicator. Adjustable extension posts accommodate bulk bags as tall as 91 in. (2300 mm) when full — necessary because lower density materials, such as those used to produce granola, occupy more space per pound/kilogram.

Palletized bags are then transported by forklift to a Dual Bulk Bag Discharger System which consists of two identical BULK-OUT® BFC Series Dischargers, each with a cantilevered I-beam, electric hoist and trolley for loading and unloading bulk bags.

From each Bulk Bag Discharger, major granola ingredients flow onto a vibratory feeder and through an adjustable weir gate into a non-metered inlet adapter on a 6 in. (150 mm) diameter, 102 ft (30.6 m) long Tubular Cable Conveyor having one vertical and two horizontal sections. The weir gate is programmed to adjust the feed rate according to the bulk density of the material.

Both dischargers rest on load cells that measure weight loss and signal the vibratory feeders to stop when a pre-programmed weight has been transferred from the discharger to a mixer purchased separately by Bakery On Main.

Minor ingredients are manually deposited into a small hopper due to the need for higher accuracy, and introduced to the TCC through a metered inlet adapter. The combined ingredients are then discharged from the TCC through a full flow inline discharge adapter and fed into the mixer.

Once thoroughly blended, the ingredients are fed into an oven, which deposits baked material onto a moving conveyor belt. Baked granola then discharges into the surge hopper of a vibratory feeder that delivers the material into a non-metered inlet adapter of a 4 in. (100 mm) diameter, 173 ft (52 m) long TCC.

The TCC discharges finished product through inline tubular discharge valves into two packaging machines equipped with level sensors that signal a PLC to maintain surge hopper fill levels by starting and stopping the conveyor. Any excess granola is discharged through the system's drive wheel discharge adapter into open boxes, which are transported by fork truck to a Flexicon TIP-TITE® Box Dumper positioned at the intake end of the TCC. The boxes are hydraulically raised to create a dust-tight seal against a discharge hood, which is then rotated to mate with a gasketed non-metered inlet adapter of the conveyor, for re-transporting of the material to the packaging machines.



Major granola ingredients enter the TCC line from the bulk bag dischargers through vibratory feeders.



Transparent section of TCC circuit allows operators to observe system performance and fill level of "pockets."



Granola ingredients flow from the TCC line through a full flow discharge adapter into the mixer.

Oatmeal production process also fully automated

The oatmeal process is also fully automated, although it requires neither baking nor addition of minor ingredients. Received in 2000 lb (907 kg) bulk bags, all ingredients are emptied by a BULK-OUT® BFC Series Bulk Bag Discharger equipped with an electric hoist and trolley that can accommodate bags up to 63 in. (1600 mm) tall.

The contents discharge onto a vibratory feeder that flows into a non-metered inlet adapter of a 4 in. (100 mm) diameter, 36 ft (11 m) TCC circuit that, in turn, discharges through a full flow inline discharge adapter into another separately purchased mixer. Blended ingredients are then auger-fed to a packaging machine.

A second 4 in. (100 mm) diameter, 28 ft (8.4 m) TCC circuit, fed by a TIP-TITE Box Dumper, hopper and vibratory feeder, supplies a second packaging machine.

Close cooperation with engineering firm eliminated obstacles

Throughout the design, engineering and installation of this totally automated and integrated system, a team of engineers from the Flexicon Project Engineering Division worked closely with the independent engineering firm commissioned by Bakery On Main to handle the overall design. “The Flexicon people were detail oriented,” says Smulders. “They had all the engineering resources needed to tailor the system to our exact needs, including suspending everything except the fillers and dischargers from the ceiling in order to minimize our space requirements. They were responsive and very easy to work with.”

“The new facility gives us the increased capacity we need without increasing our manpower requirements,” says Smulders. “It now takes less time to produce a batch. The new systems reduce damage to ingredients and are much easier on the workers. Also, because the new systems are enclosed, ingredients have much less contact with the atmosphere.”

Smulders anticipates the need for additional capacity as the market for gluten-free foods continues to grow. “With the production lines and team we’ve put together, we don’t anticipate any problems with meeting future demand,” he says.



TIP-TITE® box dumper deposits contents of boxes of excess granola back into the TCC line to the packaging line.



The second TCC circuit supplies surge hoppers of two granola packaging machines through inline tubular discharge valves.



Packages of granola exit from the packaging machine.



In the first oatmeal TCC circuit, ingredients from the cantilevered hoist style bulk bag discharger exit through a full flow inline discharge adapter into the mixer below. An inclined screw conveyor moves the mixed ingredients to a packaging machine (left).



The first oatmeal TCC line, fed by a bulk bag discharger, is in the foreground. The second oatmeal TCC line, fed by a TIP-TITE® box dumper, is in the background.



Oatmeal ingredients descend from the bulk bag discharger through a wire gate and vibratory feeder into the intake valve of the TCC circuit routed to the mixer.



Finished oatmeal packages.

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