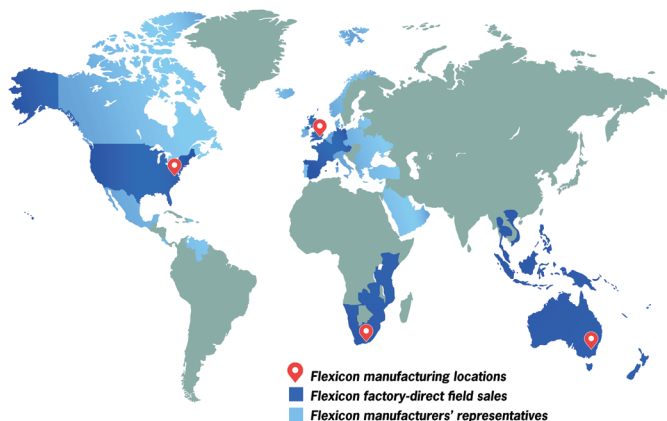




Beans discharge from the roaster into a hopper from where they are metered into the first tubular cable conveyor line.

Coffee Processor Ships Large Volumes on Time with Tubular Cable Conveyors

CC-1116



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NEW YORK, NY — “Coffee to go” at Porto Rico Importing Company means shipping 3,000 lb (1,360 kg) of coffee per day to its four retail stores, mail order customers and wholesale accounts.

Porto Rico has been doing business in New York since 1907. The company’s headquarters and one of its stores are located in Manhattan’s Greenwich Village. Three other stores are in the East Village, the Lower East Side of Manhattan, and Williamsburg, Brooklyn, along with two warehouses. Peter Longo, Porto Rico’s president, is the third generation of his family to run the company.

Porto Rico roasts, blends, grinds and packages beans in its new Brooklyn roasting facility. Operations follow a strict schedule. This includes roasting up to 150 lb (68 kg) of beans at a time, generating dozens of blends for wholesale and retail purchasers, grinding and degassing some coffee, and loading products into 25 and 50 lb (11 and 22 kg) burlap sacks for shipping.

Efficient material handling is key

At 5,000 sq ft (465 sq m), the facility is relatively small. “Since roasting, conveying and packaging areas take up almost half of our space, efficient material handling is critical to maintain production schedules,” explains Warehouse Manager Mark Kasper.

To accomplish this, Porto Rico installed two tubular cable conveying systems, special hoppers, a portable flexible screw conveyor and a half frame bulk bag discharger with an upper frame section that doubles as a filler, all including controls from Flexicon Corporation of Bethlehem, PA.

At the heart of the system are two FLEXI-DISC® Tubular Cable Conveyor (TCC) circuits, which are unique in their ability to move fragile coffee in all of its forms without degradation, dust or residual material in the conveyor at the end of a conveying cycle.

The conveyors transport coffee beans through 4 in. (10 cm) diameter stainless steel tubes using low friction polymer discs affixed to a stainless steel cable. The cable-disc assembly is driven at the discharge end by a motorized drive wheel, and kept taut by a tensioning wheel at the intake end.

A 3 ft (914 mm) section of stainless tubing immediately downstream of the material intake is substituted with a transparent section of plastic tubing, allowing operators to visually monitor performance of the system, including fill levels of the “pockets” between discs.



After loading from the roaster, the first tubular cable conveyor moves beans to a surge hopper for manual bag filling, or to two wye diverter valves (background), allowing selective discharging into a special four-bin hopper prior to blending.



Immediately following discharge, the cable-disc assembly is turned 180 degrees by the drive wheel, and passes an air knife for cleaning of any residual material, before traveling through the return circuit. At the intake end it is again turned 180 degrees, this time by the tensioning device, before passing through a pick-up adapter where coffee is metered into the system.

Beans automatically feed from multi-bin hopper to blender

Porto Rico receives green beans in bulk bags that are unloaded from a discharge station and hopper (both supplied by a different vendor). The beans are manually weighed and transferred in batches up to 150 lb (68 kg) by a pneumatic conveyor into a roaster.

After roasting, beans gravity feed into a floor hopper where they are metered into the first tubular cable conveyor circuit, traveling 9 ft (2.7 m) horizontally, then 12 ft (3.6 m) vertically, and another 12 ft (3.6 m) horizontally to either a wall mounted 13 cu ft (368 l) capacity surge hopper for manual bag filling of non-blended batches, or through two inline tubular discharge valves and two wye diverter valves into a special four-compartment hopper mounted on load cells in preparation for blending with other bean varieties.

"We need to convey the coffee quickly so we don't slow down the blender," says Kasper.

Once the bean varieties have been delivered to the four-compartment hopper, a PLC weighs batches of up to four varieties by selectively actuating the discharge valves beneath each compartment to deposit the desired amount of each bean into the blender according to weight gain information transmitted by load cells underneath the hopper. The PLC also receives signals from high and low level sensors in the compartments to prevent overfilling and to indicate when a compartment is running low on beans.

"We enter the four-bin hopper loadings on the PLC for blends. There might be 100 lb (45 kg) of beans in one compartment, 50 lb (23 kg) in another, and so on to empty into the blender," Kasper explains. Once the correct amounts are in place, blending begins.

Second TCC circuit from blender to grinder

The second TCC circuit, installed at a right angle to the first, transports blended beans from the hopper beneath the blender 6 ft (1.8 m) horizontally, then vertically 14 ft (4 m), and horizontally another 13 ft (3.9 m) where the beans are gravity fed through a hopper and a wye diverter valve. One leg is for filling 50 lb (23 kg) bags of whole bean blends, and the other leg feeds the grinder.

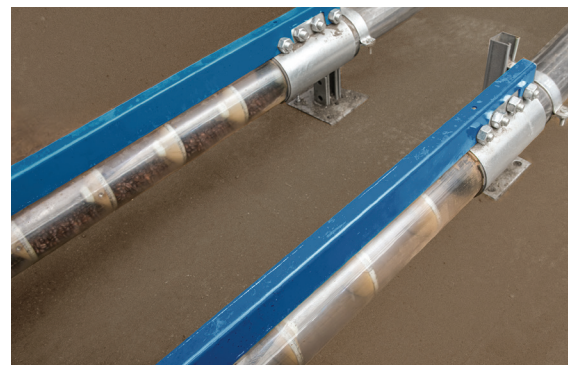
From the grinder, a portable flexible screw conveyor, 10 ft (3 m) long, transfers ground coffee at a 45 degree angle into a bulk bag, secured in the upper section of the BULK-OUT® BFF-C-X half-frame bulk bag



Each outlet from the TCC line connects to a wye diverter valve through which beans flow selectively into each bin of the four-bin hopper before beans enter the blender below.



The transfer of coffee through both TCC circuits is controlled by a PLC.



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

discharger. Since the flexible screw conveyor is portable, it can be easily removed to allow manual filling of 50 lb (23 kg) bags at the grinder. The ground coffee degasses overnight in the packaging area. The next morning the bulk bag contents are discharged into a 4 cu ft (113 l) capacity floor hopper within the split frame, from which a flexible screw conveyor transfers the coffee to a packaging machine for small wholesale packages. The 50 lb (23 kg) bags are delivered to Porto Rico's other Brooklyn warehouse for retail packaging.

Conveyors deliver undamaged product

The Tubular Cable Conveyors replace a large pneumatic conveying system used in a previous warehouse. Kasper says the pneumatic conveyor was powerful and did a good job moving material. However, it broke a percentage of beans in the process which detracted from product appearance.

No breakage occurs with the TCC systems, he says. The conveyors are dust free, present no cleaning or material changeover problems, and operate simply without blowers or filtration.

The lines operate so well, in fact, that minimal manpower is needed for operations. Kasper says only two people work with him in the warehouse.

Longo and Kasper learned about the Tubular Cable Conveyor at a coffee trade show, and observed full-scale systems in operation at a Flexicon test laboratory before placing the order.

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A surge hopper receives roasted beans from the blender via the second TCC line. At left, beans gravity feed through the blue downspout for manual bag filling of whole bean blends. At right, the roasted beans flow to a grinder in preparation for degassing.



Able to be located off-line until needed beneath the grinder, a portable flexible screw conveyor is used to transfer ground coffee into bulk bags.



After degassing overnight, ground coffee is discharged from a bulk bag on the split-frame bulk bag discharger while the flexible screw conveyor transfers the coffee to the packaging machine.



Beans before roasting.



Daily output includes 50 lb (23 kg) bags of coffee for further retail packaging.



Roasted beans.



Ground, roasted coffee product.

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