

## *Tubular drag conveyors help a coffee manufacturer reduce degradation, expand production*

A coffee manufacturer adds new tubular drag conveyors for gentler conveying that decreases material degradation.

### **New installation**

With an estimated 100 million coffee drinkers in the US spending nearly \$18 billion annually, there's little doubt that coffee production and consumption is big business. One coffee manufacturer, Eight O'Clock Coffee, headquartered in Montvale, N.J., has maintained its foothold in the coffee marketplace since its launch. The coffee brand was introduced in 1859 by The Great Atlantic & Pacific Tea

Company, a supermarket and liquor store chain. By 1930, Eight O'Clock Coffee was the most popular coffee brand in the US. Today, the manufacturer produces numerous coffee flavors easily identified in retail stores by their red bag packaging. An upsurge in demand prompted the manufacturer in 2010 to explore new equipment for its manufacturing facility in Landover, Md.



*The freshly roasted coffee beans discharge from the roasters into a hopper that directs them to the tubular drag conveying system, which gently conveys them to one of two high-speed packaging machines.*



## Selecting a new conveying alternative

The first step toward expansion was installing a second high-speed packaging system that the manufacturer purchased from a supplier in Italy. Until this time, the manufacturer had been using mechanical and dilute-phase pneumatic conveyors to move coffee beans and ground coffee from roasters to the packaging equipment. The addition of the new packaging equipment required an additional conveying system that could transfer the coffee from 11 roasters to bagger hoppers above the packaging equipment while minimizing material degradation.

While the manufacturer was considering its options, one of its current equipment suppliers made an enticing offer. The supplier had designed a new tubular drag conveying system and offered the coffee manufacturer an attractive price to try it — an experiment that would benefit both the supplier and manufacturer. In the end, the manufacturer would find a solution ideal for conveying whole bean and ground coffee. The supplier — Spiroflow Systems Inc., Monroe, N.C., a powder handling and processing systems supplier — was able to tweak its tubular drag conveyor to improve the system.

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**The roasted beans discharge from holding silos into a tubular drag conveying system that moves them vertically and then horizontally above the plant's coffee grinders.**



The manufacturer accepted the offer and initially purchased four stainless steel Cableflow tubular drag conveyors. The manufacturer hired local contractors to complete the installation, which one of the equipment supplier's engineers supervised. The engineer also supervised the control programming and trained Eight O'Clock's personnel to run the system. The conveying equipment could move whole or ground coffee from the manufacturer's 11 roasters to the new high-speed packaging machine hopper at up to 10,000 lbs/hr.

### The tubular drag conveyors

One tubular drag conveyor is 34 feet long and is operated by an individual control panel. Three additional conveyors operated by a single master control panel transport ground or whole bean coffee to a vertical height of 8 feet and horizontally up to 46 feet to discharge into the packaging hopper. The three conveyors are 74-feet long with three legs, two directional changes, two inlets, and one outlet; 86 feet with three legs and two directional changes; and 103 feet with eight legs and five directional changes.

Each conveyor consists of two 4-inch-diameter stainless steel tube sections (an infeed tube and a return tube) with

a turnaround section at one end and a variable-speed 3-horsepower drive-and-sprocket assembly at the other, forming a continuous circuit. The turnaround section connects the infeed and return tubes at the infeed end and includes the equipment supplier's proprietary automatic cable-tensioning device. The drive-and-sprocket assembly connects the tubes at the discharge end. If necessary, a strategically placed mechanical corner in the conveying circuit redirects material at horizontal or vertical right angles. The conveyor has stainless steel construction making it suitable for food-grade applications.

A continuous flexible Type 304 stainless steel cable is installed inside the enclosed tubes, and solid, food-grade, ultrahigh-molecular-weight polyethylene (UHMW-PE) circular discs are mounted on the cable at 6-inch intervals. The discs are shaped to ease material movement and reduce degradation. Since the discs are nearly the same diameter as the tubes, their narrow clearance with the tube walls ensures that the coffee stays between them during conveying and minimizes residue on the tube walls. To minimize downtime between product runs, food-grade wiper discs mounted periodically on the cable keep the tubes clean. When a material changeover

takes place, a felt-wrapped clean-out disc with alcohol applied is used to clean the conveyor thoroughly.

The conveyor can travel in multiple directions, from horizontal to vertical and at many angles. Instead of traditional sprockets and bearings at corners, the tubing is bent to form sweeps. "By doing that, you're not taking the material around hard edges," says Dave Hesketh, the supplier's vice president of engineering. "The system's goal is to create a smooth path for the product without creating a nip point on the conveyor that would trap the product against the wall or the joints in the system, where degradation would occur."

The conveyors and process equipment are fully automated and integrated with a central controller, allowing remote control and monitoring of the entire process from one location. Using the controller interface, an operator enters the SKU for one of the company's coffee products and pushes the start button. The controller then automatically opens and closes the necessary valves, and the conveying system moves the beans or ground coffee through the production process from the roaster to the packager.

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## Improving the production process

The new installation wasn't without its problems at first. The manufacturer quickly realized that the rope and disc assembly, where the discs are bolted in place on the wire cable, wasn't rugged enough. The supplier replaced the original 1/4-inch cable and added a new assembly to meet the manufacturer's needs. The supplier re-engineered the system to create a fully encapsulated, coupling-free one-piece disc.

"The design was beefed up and now is wonderful," says Richard Holiday, Eight O'Clock coffee plant engineer. He notes that the tubular drag conveyor "is designed to automatically bring up the slack of the tensioning system rather than needing to correct slack manually. This is time saving and reduces breakdowns."

Other features Holiday cites as beneficial include the tubular drag conveyor's ability to make three directional changes, its slide gates that allow material to go to two different machines, its gentle conveying for whole beans, and its clean-out cylinder. This cylinder allows the coffee to be drained into a tote with no need to connect pipes, drains, or hoses like the previous system required.

Since the redesign of the tubular drag conveying system, Holiday says his company has experienced no mechanical issues. His company has been so satisfied that the supplier was recently on-site to install two additional tubular drag conveyors.

"I would say that the tubular drag conveying system is running 99.8 percent," says Holiday. "It's a slow-moving system that allows us to convey a lot of coffee. It's very reliable and dependable and our operators love it. We also love that Spiroflow is very service-oriented with great support and resources." **PBE**

**Note:** Find more information on this topic in articles listed under "Mechanical conveying" in *Powder and Bulk Engineering's* article index (in the De-

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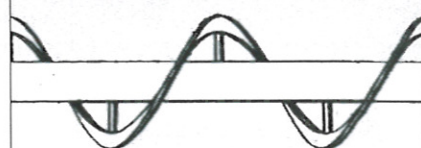
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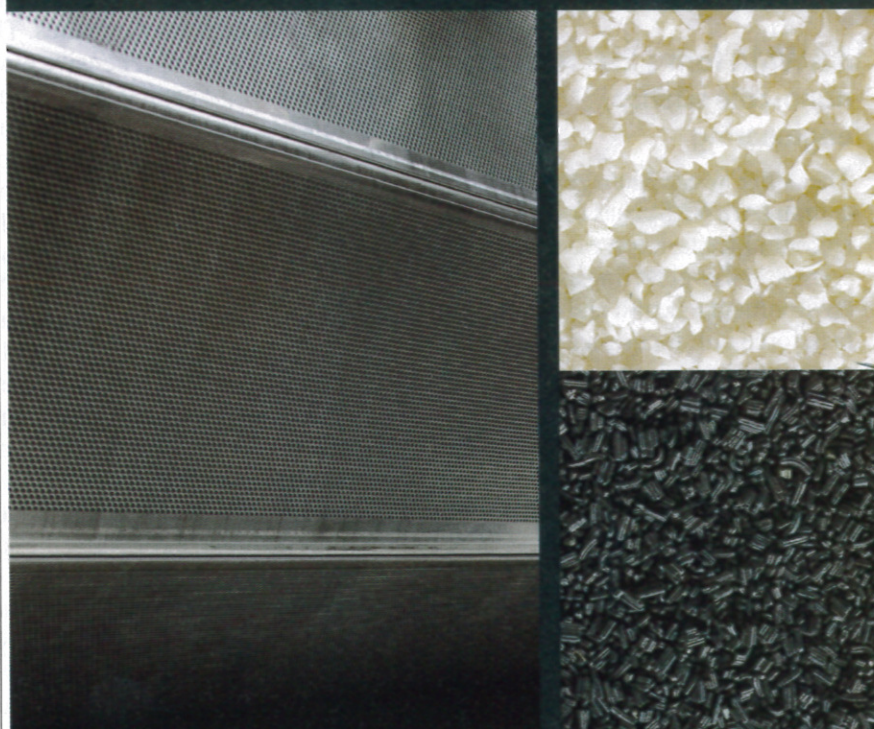
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