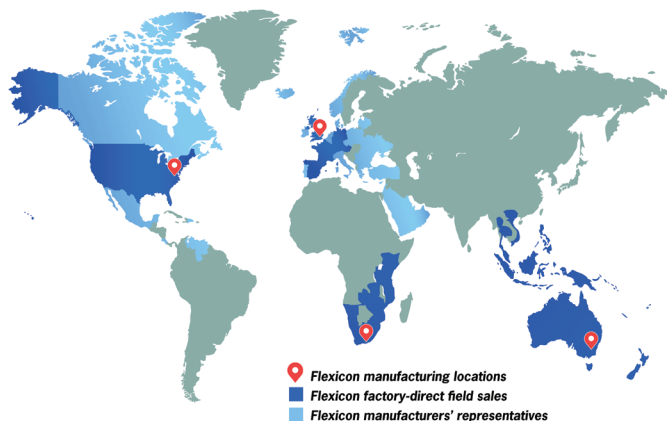




The upper flexible screw conveyor regulates the flow of MILO drink mix powder to a metal detector, improving detection accuracy, while reducing downtime and material waste. The lower flexible screw conveyor moves contaminant-free powder to the sachet filler.

Nestlé Singapore Improves Metal Detection with Flexible Screw Conveyor

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SINGAPORE — MILO is made from the goodness of milk, malt barley and cocoa and packed with essential vitamins and minerals. Owned by Switzerland-based Nestlé, the MILO brand has been popular in Southeast Asia, Australia and worldwide for decades. It is one of many products manufactured at Nestlé's plant in Singapore, where the company has operated since 1912. MILO® is an essential in many Singaporean households and continues to be in the forefront in meeting their evolving tastes and the need for healthier and more nutritional products.

The Singapore plant produces and packages MILO drink powder in formats including tins and easy-open, easy-pour sachets that are formed and filled on a high-speed rotary filler. Upstream of the sachet filler is a metal detector that scans the powder to identify contaminants. Detection of a contaminant, called a “strike,” triggers the metal detector to divert a portion of the powder stream into a collection bag. Workers then inspect the rejected powder to verify that the contaminant was removed, and log the incident into a quality-assurance report. This had been a cumbersome process until a flexible screw conveyor smoothed the flow to the metal detector.

Agglomerated powder complicated detection

The metal detector originally sat directly below the surge hopper that discharged the MILO powder via gravity through a butterfly valve. “When the valve opened, often one large chunk of powder would flow through the metal detector which wasn't fast enough to reject the whole chunk,” says Sean Phua, engineering manager. As a result, some portion of the powder — and possibly the contaminant — passed through the metal detector and into a flexible screw conveyor that transferred it to the sachet filler. That would force operators to halt production.

With production halted, the operators would run the flexible screw conveyor in reverse to empty all the powder in flight. That powder, along with the rejected material, was then hand-sieved and dissolved with water to find the contaminant and “determine whether we had a real or a false strike.” It was messy and the interruptions reduced packaging productivity, Phua says.

He learned that the operation would improve if the powder could free fall into the metal detector in a steady stream. One possible solution would be to add a rotary valve under the surge hopper, but lack of headspace made that impossible, Phua says. Instead, Flexicon recommended offsetting and raising the metal detector, allowing room to add a new flexible screw conveyor to feed powder to the metal detector in a steady, controlled flow. Flexicon Singapore provided the new conveyor to accommodate spatial constraints and throughput requirements.

The conveyor is 1.5 m (59 in.) long and includes a spiral enclosed in a 90 mm (3.5 in.) diameter outer tube made of ultra-high-molecular-weight



Contaminant-free powder gravity feeds from the raised metal detector (top-right) and is transported by the flexible screw conveyor to the sachet filler.



At floor level, an operator attaches bulk bag straps to Z-Clip™ strap holders of a bag lifting frame held in position by a forklift.

polyethylene. The screw — the only moving part that contacts the product — ensures that the powder does not pack, cake or separate.

The conveyor includes a 150 mm (5.9 in.) diameter inlet flange and charging adapter that connects under the surge hopper's butterfly valve. From there, the powder is transported at a 41-degree angle and discharges into the metal detector through a 150 mm (5.9 in.) diameter downspout. The conveyor's 2.2 kW (1.3 hp) drive turns at a constant speed to transport about 720 kg (1,587 lb) of powder per hour for 20 hours a day. Level sensors at the conveyor's inlet and discharge are linked to the sachet filler's controls, enabling both units to operate in sync.



Nestlé Singapore packages 720 kg/hour (1587 lb/hour) of healthful MILO drink mix powder.

Regulated flow improves detection, cuts downtime

According to Phua, the new flexible screw conveyor has streamlined the operation. "All strikes are rejected before the powder enters the original flexible screw conveyor to the sachet filler," he says, "eliminating false rejections and manual clearing of powder from the conveyor." His colleagues in the quality-assurance department welcome the improvement. "Because we have more positive rejection from the metal detector, quality assurance people have less worry about contaminants not being rejected."

More reliable rejection boosts productivity by increasing sachet filler uptime and reducing incident reporting, while conserving product. "Previously, large chunks were being rejected. Now as a freefall, less powder is flowing, which reduces product loss by a good amount," he concludes.



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