

# Powder and Bulk Engineering

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## SCREENING AND CLASSIFYING



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## Case History

### AUTOMATED POWDER UNLOADING SYSTEM SPEEDS BLENDING PROCESS BY 25 PERCENT

CLEVELAND, OH—At Forbes Chocolate, an automated bulk bag weigh batch discharger with flexible screw conveyor feeds 25% to 33% more main ingredient into three ribbon blenders per shift than previous manual dumping of 50-lb (22.5 kg) bags—a 1500 lb/hour (675 kg/hour) increase with no increase in labor.

Health and safety improve as workers no longer cut open, lift and empty bags into a manual dumping station. Dust is fully contained as material transitions from bulk bag to floor hopper to flexible screw conveyor to auger to ribbon blenders, preventing contamination of the product and plant environment.

The automated cocoa powder unloading system consists of an 18'4" (550 cm) high bulk bag discharge frame. A cantilevered I-beam supporting a trolley and electric chain hoist allow loading where a forklift cannot fit. Beneath the frame, a 1 cu ft (0.03 cu m) capacity high-flow hopper connects to a 5-ft long (150 cm) flexible screw conveyor inclined at 23° that feeds an auger conveyor through a transition adapter and bellows.

The precise amount of material discharged from the bulk bag is controlled by a loss-of-weight batching system. As the bag discharges, load cells supporting the discharger's frame transmit weight-loss signals to a controller that runs the conveyor at high feed rate until the majority of the batch is discharged, reducing the feed rate to dribble, then stopping the conveyor once the precise batch weight has been discharged. System software automatically compensates for material in-flight.

"Instead of previously manually weighing 500 pounds (225 kg) of main ingredient, we just push a button," says Keith Geringer, Forbes vice president of manufacturing. "Unloading is 50% faster."

#### Fits into Tight Space

Due to a space limitation Flexicon supplied a "push" type flexible screw conveyor that locates the 5-hp drive at the lower intake end of the conveyor rather than the upper discharge end.

In operation, the hoist and trolley position the 87-in (220 cm) long bulk bag on the unloader frame. Pneumatically activated Flow-Flexer® bag activators promote flow of the non-free-flowing powders through the bag spout by raising and lowering opposite bottom edges of the bag at timed intervals. As the bag empties, the stroke of the plates increases, ultimately raising the bottom of the bag into a steep 'V' shape for complete discharge with no manual intervention.



Automated bulk bag weigh batching system consists of 18'4" (550 cm) high discharger frame and 5-ft (150 cm) long flexible screw conveyor. Under loss-of-weight control, the system discharges precise amounts of powder into an auger conveyor that feeds three ribbon blenders.

Dust is suppressed by a 15-in (38 cm) diameter iris flow control valve that allows the operator to pull the tied bulk bag spout into the spout access compartment and close the valve around the spout. The spout is then untied, the compartment's access door closed, and the valve released slowly, preventing uncontrolled bursts of material from displacing air and dust from the hopper.

The food grade flexible screw conveyor pushes the powder through a 6-5/8-in (16.8 cm) diameter UHMW polyethylene outer tube enclosing a rugged, flexible stainless steel screw. The only moving part contacting the material is the flexible screw, which self-centers as it rotates, providing ample clearance between the screw and tube wall for gentle product handling.

In selecting the automated powder unloading system, Geringer rejected an automatic bag opener and dumper, concerned about paper pieces and bag surface material contaminating the powder.

This small, 100 year old company supplies chocolate powder to dairies for chocolate milk and ice cream, and to the baking industry for desserts. The company has met increased demand with new packaging and filling equipment and automated systems for unloading its main ingredient.

In addition to bulk bag dischargers and flexible screw conveyors, Flexicon manufactures pneumatic conveying systems, bulk bag fillers, manual dumping stations, drum dumpers, weigh batching and blending systems and plant-wide bulk handling systems with automated controls.

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