

Application Example

Contained Transfer and High Accuracy Dosing of Powdered Drink Mixes for the Beverage Industry

Background

In today's market food manufacturers have become extremely sensitive to the effect of exact product feeding and ingredient delivery to the packaging process. An improvement of even 0.25% in ingredient dosing weights can equate to thousands of dollars saved in long term operating costs, as well as valuable improvements in the overall product quality. The use of a gravimetric feeder, such as the K-Tron Smart Weigh Belt (SWB), offers a number of benefits for the process. The highly accurate controls and weighing technologies enable it to control the rate at which ingredients are added to a process very accurately: within $\pm 0.25\%$ of the desired feed rate. Higher accuracy means better inventory control and less waste. The actual cost savings can be demonstrated by conducting material test trials with the actual ingredients used and at production rates either on site in the customer's plant or at one of K-Tron's fully equipped test labs.

For these reasons, when the requirement for a contained, highly accurate metering solution for delivering powdered drink mix to the packaging line arose, a renowned global food manufacturer turned to K-Tron for a solution.

Application and Process Details

The previous manual process of product delivery and feeding to the packaging line was unreliable. The desired solution required two lines for the contained transfer of the powdered drink blend to a feeding device with design feed rates of up to 6,000 kg/

hr (13,200 lb/hr). In addition, the existing space offered limited height for overall equipment stackup. The low height profile of K-Tron's SWB-300 coupled with a system for contained vacuum transfer of the powder offered the perfect solution. The addition of a rotary valve directly above the feeder allows for controlled delivery of the material to the weigh belt below. Flexible bellows between the airlock outlet and the feeder inlet isolate the belt feeder so that accurate weighing and feeding can occur.

The current installation operates on a three shift basis, processing approximately 4.5 metric tons per hour (9,900 lb) of the powdered drink blend. Material is conveyed to a hopper mounted above the Smart Weigh Belt Feeder. Material is then metered directly into the packaging line (see the weigh belt principle outlined on page 2).

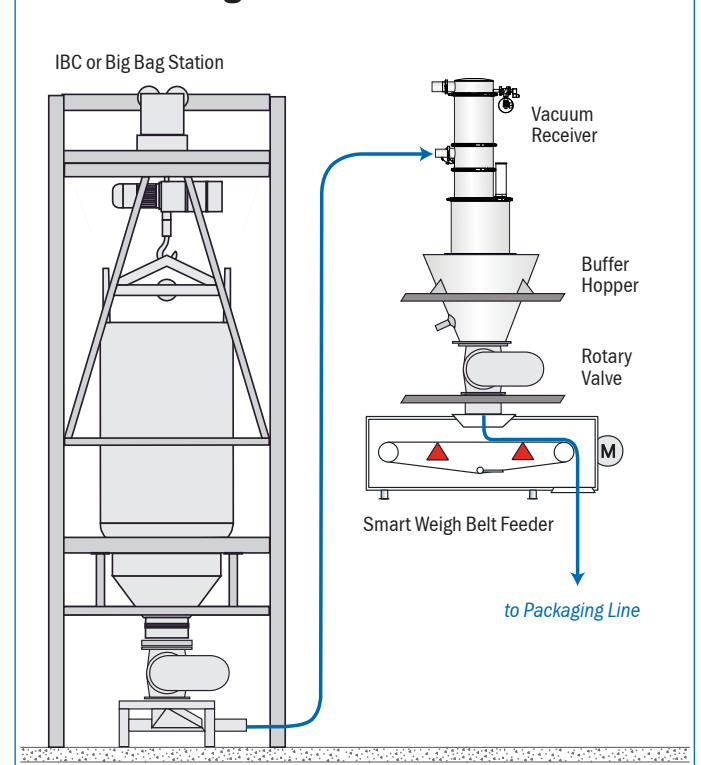
In order to keep the complete system as dust free and as clean as possible, the weigh belt feeder also included a specialized enclosed housing with a dust exhaust connection for ventilation.

The installation and testing of the supplied equipment was completed within a matter of weeks. The experience of the K-Tron Process Group in providing complete solutions for extensive material handling requirements was critical in this installation. These important K-Tron advantages enabled the plant personnel to install a compact and sophisticated solution for their process. In addition, the overall technical support and service typically provided by the K-Tron service personnel has been invaluable to the customer. The Food Production Manager stated "K-Tron did not just supply us with



Smart Weigh Belt feeder shown with vacuum receiver, buffer hopper and AeroLock rotary pre-feeder.

Process Diagram



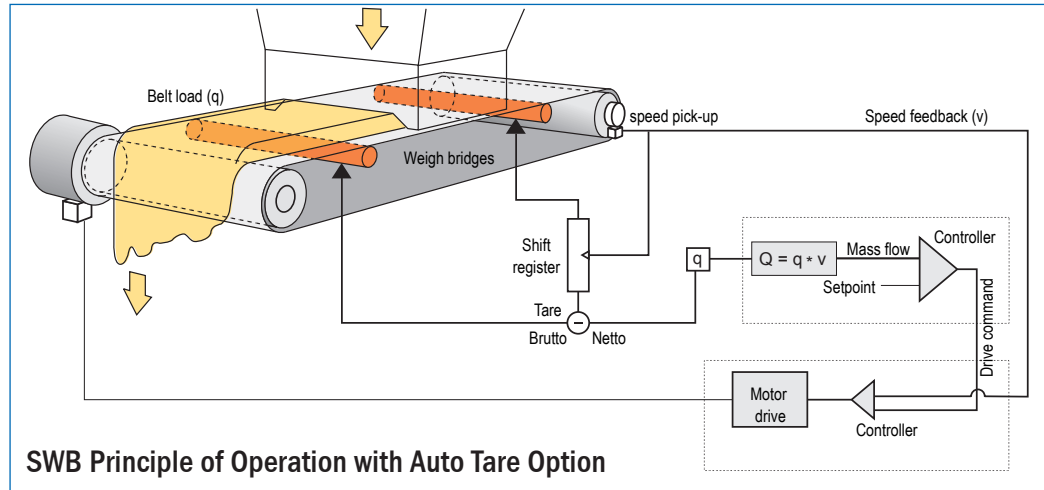
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a single piece of equipment, they provided us with a whole solution. In addition, K-Tron has provided us with excellent after sales support, being available 24/7, which is very important to our busy three shift business.”

Smart Weigh Belt Principle of Operation

The K-Tron SWB is used for the continuous controlled gravimetric feeding of bulk materials. The unit can also be used for gravimetric batch feeding or continuous metering of bulk material flow. The feeder includes a primary weigh bridge located below a continuously rotating belt. In addition, the optional secondary weigh bridge, which was included in this installation, offers auto-taring while reducing the need for frequent calibration and improving long term stability.

As shown in the graphic above, as material falls onto the belt the primary weigh deck measures the weight of the belt with material while the secondary weigh deck measures the weight of the empty belt. K-Tron’s patented SFTIII weighing technology features vibration and temperature immunity, zero deflection and 1 part in 4 million resolution. The K-Tron KCM controller compares the desired mass flow or setpoint with the actual mass flow measured and adjusts the belt speed accordingly. The combination of the highly advanced weighing



technology and the detailed control algorithms provide for high accuracy metered feeding of the product to the process below.

Smart Weigh Belt Feeder Advantages

Due to the design of the feeder, the SWB requires a much smaller height profile and provides the same equivalent accuracies as taller loss-in-weight feeders. In addition, the belt tensioner device and easy access housing permit quick belt changeover and cleaning. *(For more information on the SWB or to view a video of actual assembly and dismantling of the SWB visit www.ktron.com).*

The SWB can be provided for capacities from 20 to 40,000 kg/hr (44 to 88,000 lb/hr) and is available with a variety of options dependent upon the installation requirements including designs for processes with high pressures and/or temperatures.

In addition to the features outlined above, the SWB in this application was designed with an ATEX Zone 22 inside rating due to the dusty nature of the powdered drink mix.

The exact quantification of how much an improvement in feeding accuracy can actually improve the overall manufacturing costs can sometimes be difficult to measure. K-Tron offers a software program called "FeedSmart" that allows the customer to calculate potential operating cost savings simply by entering various ingredient costs and operating parameters into the program and getting results that can be verified by performing actual trials.

K-Tron Advantage

- K-Tron’s patented SFT digital weighing technology delivers the high accuracy weight measurements needed for maintaining control of the addition of costly ingredients

- The K-Tron Control Module (KCM) provides integrated control of motor, weigh bridge and drive functions
- Availability of second weigh bridge with continuous taring ensures that either dust buildup or product buildup on weighing device has no effect on overall accuracy
- Less height requirement with equivalent accuracies of loss-in-weight feeders
- Improved belt cleaning design as well as reduced maintenance requirements
- Trapezoidal inlet design allows for improved material flow from feed storage bin
- Models available in open frame or closed frame designs for ease in accessibility, cleaning and maintenance
- Minimal product damage or attrition due to gentle action of weigh belt

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