

Application Example

Gain-in-Weight Batching of Soft Drink Concentrate

Introduction

Soft drinks typically are comprised of water, carbonation, and a flavor concentrate in powder or syrup form. Limits on the shelf life of the end product lead manufacturers to produce and bottle drinks locally. Since the concentrates typically have a longer shelf life, they can be produced centrally and then shipped locally for distribution to multiple bottling plants. The concentrate recipes can vary greatly, depending upon the market requirements of the local bottling plant. Therefore, the processing system provided is also required to be versatile, with the capability of the controls system to handle a wide variety of raw ingredients all in varied amounts. The process described herein incorporates a completely automated material handling and measuring system for the production of these various concentrate recipes.

Application and Process Details

Most soft drink concentrates are generally comprised of a number of powdered raw materials, which are mixed and packaged according to various recipes. Some ingredients may be fed in larger amounts, (25-1000 kg), while other ingredients may be fed in amounts as small as .02 – 32kg.

The raw materials are supplied to the production area in either 25 kg sacks or 1000 kg FIBC's. In one such application, a turnkey system provided by Coperion K-Tron and its turnkey systems partner, Dinnissen, was required to be capable of handling either type of raw material delivery. FIBC unloaders handle unloading of the "big bags" while individual sack tip stations handle the sack unloading. Each raw material is in turn fed to a Coperion K-Tron Volumetric screw feeder. Because these feeders are volumetric, the

sack tip stations are mounted directly onto the feeder hoppers, thus keeping the overall headroom and total surface area that must be cleaned to a minimum.

Below the feeders, a conveyor belt transfers the boxes that need to be filled into the correct position. Once the boxes are positioned, the belt is lowered so that the boxes rest on scales. The ingredients are fed into the boxes according to the preprogrammed recipe and the Gain-in-weight (GIW) batch principle described below. As the correct amount is weighed into each box, the belt moves the boxes to the next position and the cycle begins again.

Gain-in-Weight Batching Principle

Gain-in-weight batching employs the use of highly accurate volumetric feeders that are integrated with the scale on which the empty box or container sits. A batch cycle is generally made up of two phases; during the first phase, 90% of the batch weight (as determined by the preprogrammed recipe) is fed as fast as possible. During the second phase the last 10% is fed in a slower "dribble" mode to ensure an accurate result in achieving the weight setpoint. When the setpoint is achieved, the feed is stopped. In most cases, the controller switches a single feeder between the two modes to achieve a batch.

The Solution

As stated above, modular volumetric Coperion K-Tron feeders are used to feed the raw ingredients into boxes. The smaller batches (20 –500 gram) are fed with a 20 mm twin screw K-MV-KT20 feeder. The medium range batches (0.5 – 15 kg) are fed with a 60 mm single screw K2-MV-S60 feeder.

However, the larger batches (15-32 kg) utilize two feeders, a 60



Coperion K-Tron Gain-in-weight batching assembly

mm single screw (K2-MV-S60) and a 100 mm single screw (K2-MV-S100) combined in order to ensure fast, accurate feeding. Because the batch time had been set at 20 seconds, the resulting corresponding feed rate is up to 5760 kg/hour. Although the larger 100 mm screw feeder can handle this rate easily, the large screw limits its accuracy when utilized in the slower dribble mode. Therefore, when weighing the larger batches, both the 100mm and the 60mm screw feeders run simultaneously during the first phase to feed the bulk of the batch, then the larger K2-MV-S100 is

stopped and the K2-MV-S60 completes the dribble phase of the cycle. By combining these two feeders, the large batch can be fed extremely accurately in the short batch time required.

Applications

Typical GIW Batching Macro and Micro Ingredient Food Applications:

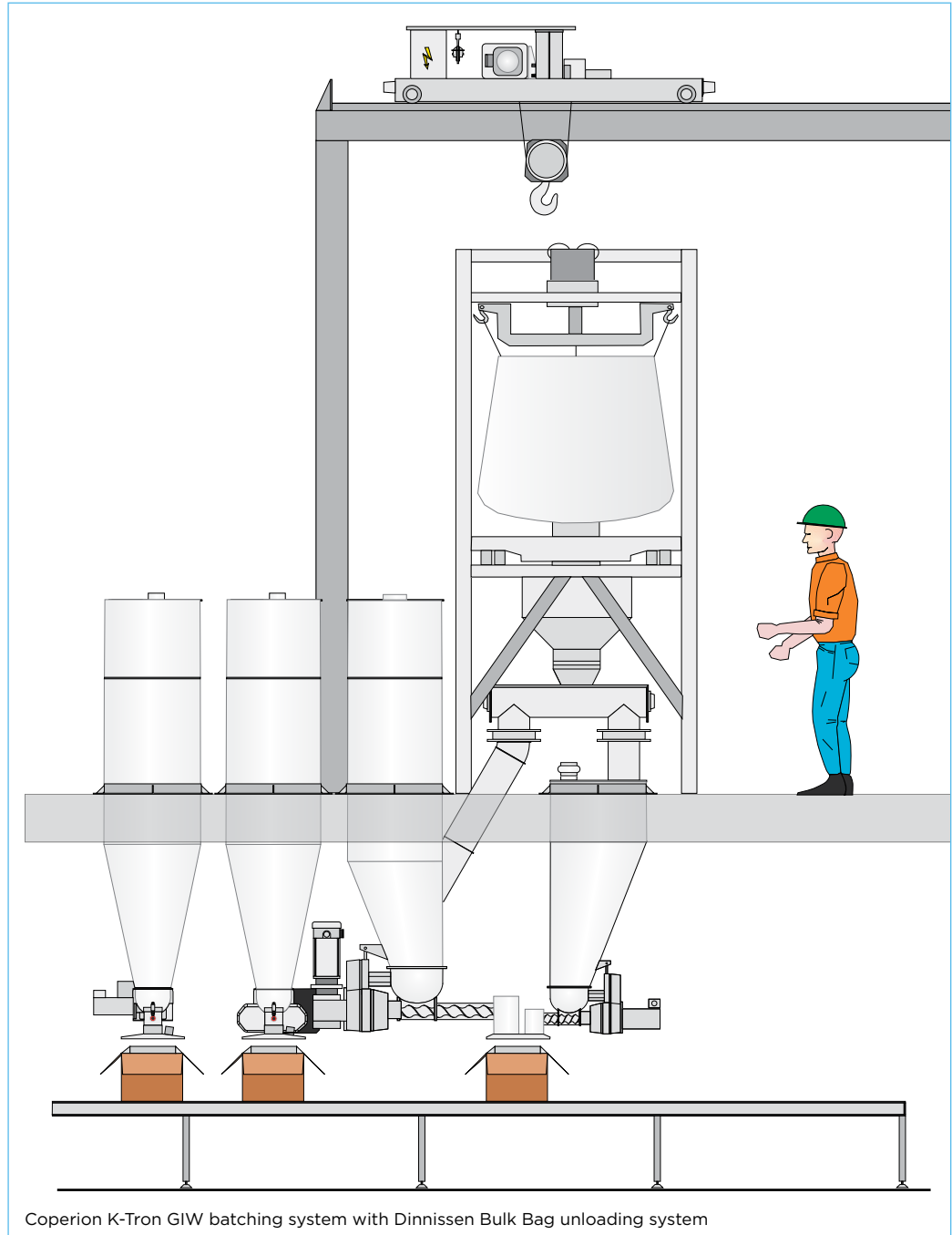
- Bakery Mixes
- Snack Foods
- Soft Drink Mix Blends
- Vitamin or Neutraceutical Powder Blend

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Coperion K-Tron Advantage

- The Coperion K-Tron feeder easy clean design enables extremely quick turnaround and changeover after cleaning for contaminant free operation
- Coperion K-Tron is able to provide a wide variety of screw and agitator designs, in order to give best results for the high variety of ingredients
- All product contact parts are constructed to conform with strict cGMP standards
- Coperion K-Tron's experience in handling frequent washdown ensures that the complete system is engineered with ease of cleaning and maintenance in mind
- Each material handling solution is custom developed according to the process application, based upon Coperion K-Tron's extensive experience in handling a wide variety of difficult to handle powders
- The Coperion K-Tron Systems Group can supply integrated systems of Coperion K-Tron and ancillary products, with one source management



Coperion K-Tron GIW batching system with Dinnissen Bulk Bag unloading system

