April 16, 2018

Comments on S&T Item ABW-4:
A. Application and Appendix D: Definitions – batching system

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Position: I am opposed to this item, particularly the proposed definition, and encourage a vote against the proposed changes. The definition is incorrect and insufficient, because **it is based upon how commodities are processed subsequent to weighing**, rather than upon how the scale is designed or based on it method of operation. What is proportional weighing? Is a scale that weighs 100% of the same commodity for a transaction considered proportional weighing? The definition does not adequately distinguish between automatic bulk weighing systems and automated weighing (or weighing and metering) systems that utilize multiple scales to achieve a desired mix of a subsequent product. Additionally, the proposal does not include specifications for loss-in-weight scales, which were one type of scale used in the automated batching system cited by the submitter as justification for the proposal.

Explanation:

The proposed definition incorrectly and inappropriately defines a batching scale in terms of how the weighed commodity is processed subsequent to the weighing operation. Handbook 44 categorizes scales based upon a combination of factors, including the design of the scale (e.g., hopper scale and monorail scale), use (e.g., as a grain hopper scale and animal or livestock scale), method of operation (e.g., static weighing or in-motion weighing) and commodity weighed (e.g., grain or aggregate). How a commodity is processed after the weighing operation is completed is irrelevant to the categorization of the scale.

One objective of automated weighing systems is to reduce or eliminate the need for human intervention in the weighing processes. When weighing systems are automated, then safeguards must be incorporated into the weighing system to prevent weighing errors. However, these safeguards are not incorporated into the proposal; in fact, the submitter has stated that one objective is to eliminate these safeguards. An automated weighing system should be required to return to zero and an automatic zero setting mechanism should not be permitted to operate on these automated systems, especially if multiple drafts of the same product are weighed as part of the same transaction. In loss-in-weight weighing systems, the scale never returns to zero, since only part of the contents of the supply hopper are weighed into the "batch" for any given transaction and the supply hopper is refilled before it is ever completely emptied. This proposal does not contain any requirements for the proper recording of weight values for these scales, which fall under this definition.

This proposal is incomplete and ill-advised. This proposal should be rejected.

Additional information on gain-in-weight and loss-in-weight weighing systems is provided in the attached appendix.

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Appendix

Batching Systems: Examples

Web site accessed on March 17, 2018.
https://www.ingredientmasters.com/gain-in-weight-vs-loss-in-weight-batching-systems/

How Can I Determine Whether a Gain-In-Weight or Loss-In-Weight Batching System is Right for My Application?

When determining whether a gain-in-weight or loss-in-weight system is best for your application, the first step, we believe, is to recognize that this is a complex decision with roughly a dozen factors to consider—and each of these factors impact all the others! It is one of the most complex determinations involved with specifying a batching system.
That said, the first step is to clarify priorities. Gain-in-weight is slower, but more accurate, since you are weighing only the amount discharged, and only one product at a time on each scale. Loss-in-weight is faster, since you can discharge all the products at the same time. But it is less accurate.

Loss-in-weight allows you to discharge several ingredients simultaneously, but you need to monitor the weight of the discharging vessel. Most scales have a range of 10,000 increments, which must cover the total material to be weighed. Thus, a 10,000 lb. holding vessel can be weighed out in loss-in-weight mode in ± lb. readout. If your discharge requires ±.1 lb. accuracy, of course, that option is not workable.

Other considerations include location, size of batch, time of batch, type of material, vibration in the area, sanitation requirements, clean-out, and cost. Finally, whether you are building a new facility, or retrofitting a plant that is running at full capacity, has some bearing on which choice will best serve your needs.

Let us offer some thoughts on a few of these considerations.

If batches are small, you are likely more concerned with accuracy, so gain-in-weight is preferable. Regarding the type of material, if it is pharmaceutical grade, accuracy is critical, so again, gain-in-weight is the better option.

Is there vibration in the area? There are more load cells in a loss-in-weight system, and just one set in a gain-in-weight system. So, if there is vibration—a common condition—loss-in-weight may be preferable, all else being equal. Of course, the higher the batch weight, the less important vibration becomes.

Regarding sanitation, if you have to disassemble equipment for cleaning, as is the case with pharma and food products, gain-in-weight systems are much easier to manage.

Is the number of ingredients you are batching always the same?

If batches are small and the recipe changes, you need to strike a balance between accuracy and speed. Two or three ingredients in a 4000-lb. recipe? That's a situation ideal for loss-in-weight, unless accuracy requirements are extreme. Need very high accuracy? Gain-in-weight will produce a better result. Need high production speeds? Loss in weight will almost always be the better choice, but there can be a balance between the two types of systems.

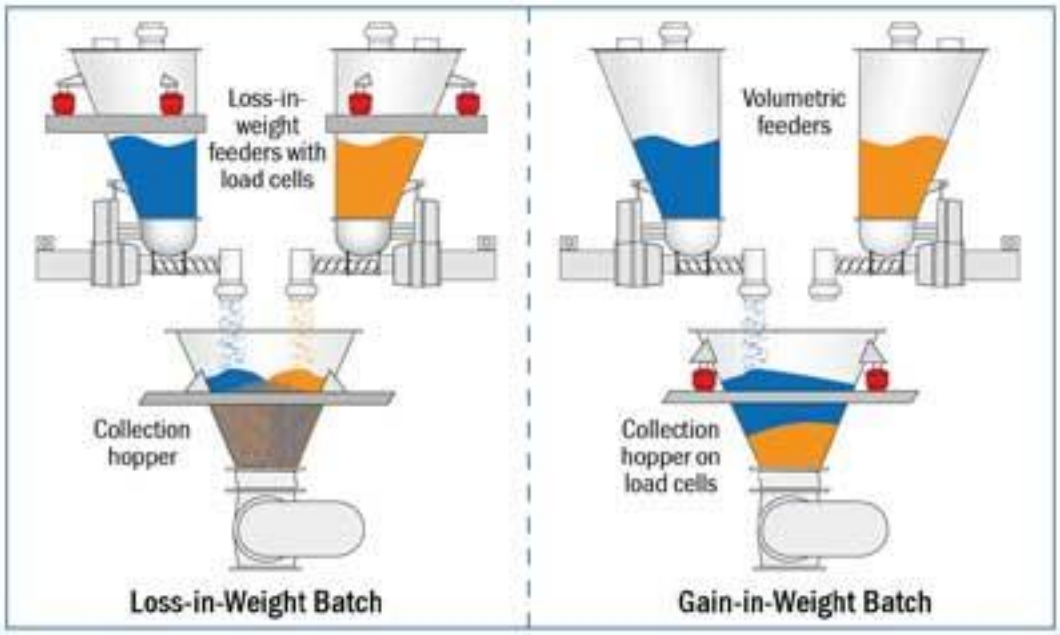
The new vs. existing facility question primarily relates to available space, and whether the material will originate in paper bags, silos or bulk bags.

So, a quick summary: Gain in weight is more accurate and more controllable—just a little slower, although you can accelerate production speed by producing multiple batches simultaneously, even when recipes differ. If you have the luxury of flexibility—if you're building a new plant, for instance—this can be an incredibly efficient option.

The web sites were accessed on December 14, 2014. The web sites have been changed and the links may no longer work.
http://www.ktron.com/process-equipment/feeders/technology/batch-feeding.cfm
http://www.ktron.com/process-equipment/feeders/technology/gain-in-weight-batching.cfm
http://www.ktron.com/process-equipment/feeders/technology/loss-in-weight-batching.cfm

Batch Feeding and Weighing Systems

There are two principle batching methods for weighing and feeding bulk materials



The manufacture of any blended product typically involves the intermediate process steps of transfer and weighing or batching of individual ingredients based upon their weight percentage

in a blend. Depending on this percentage, materials are categorized as majors, minors and micros.

A Gain-in-Weight (GIW) batching station includes volumetric metering devices, such as screw feeders or valves, that deliver the product to a hopper on load cells. The Loss-in-Weight (LIW) batching system employs gravimetric feeding devices, such as loss-in-weight screw or vibratory feeders, which are mounted on individual load cells or scales. In cases where small amounts of micro ingredients are required, both methods may be employed: LIW feeders for the micros and minors, and GIW batchers for the major ingredients.

Gain-in-Weight Batching Principle

Volumetric feeders are often used in Gain-in-Weight (GIW) applications for controlled batch dispensing and weighing of dry bulk materials. Batching may take place directly into IBCs (Intermediate Bulk Containers), hoppers or drums. Batched ingredients may also be dispensed directly into batch blenders. Where hazardous ingredients are among the batched ingredients, processors need a batching device where ingredients can be easily contained to eliminate any exposure of the product to the operator or to the environment.

In GIW batching the volumetric metering devices sequentially feed multiple ingredients into a collection hopper mounted on load cells. Each feeder delivers approximately 90% of the ingredient weight at high speed, slowing down towards the end of the cycle to deliver the last 10% at a reduced rate (often called "dribble mode") to ensure higher accuracy.
The GIW controller monitors the weight of each ingredient and signals each volumetric feeder to start, increase or reduce speed, or stop accordingly. Once all the ingredients have been delivered, the batch is complete and the mixture is discharged into the process below.

Loss-In-Weight Batching Principle

LIW batching is used when individual ingredients must be weighed more accurately or when the batch cycle times need to be very short. Gravimetric feeders operating in batch mode simultaneously feed multiple ingredients into a collection hopper. Adjustment of the delivery speed (on/off, fast/slow) lies with the LIW feeder controls. Since each feeder has its own dedicated weighing system, the LIW batching system, delivers highly accurate batches for each ingredient.

Once all the ingredients have been delivered, the batch is complete and the mixture is delivered to the process below. Since all ingredients are being metered at the same time, there is no layering of ingredients, and the overall batch time as well as further processing times downstream are greatly reduced.

This method of batching is preferred where micro ingredients are involved, since highly accurate weighing is often required by the recipe and by the desire to control the cost of expensive ingredients.