

# What can I do to improve my batching system's operating efficiency?

Typically, ingredient-batching systems can be categorized into three different technology options: gain-in-weight batching using scale weighing operations, gain-in-weight batching using volumetric feeders, and loss-in-weight batching using gravimetric loss-in-weight feeders

Each of these technologies has inherent advantages and limitations. When choosing the most efficient system, it's important that you review the critical criteria you require for the system, such as batch time, degree of accuracy, amount of time allowed for quick changeover and cleaning, and, of course, overall cost.

*Gain-in-weight batching using scale weighing operations.* A scale hopper is a receiving hopper suspended on load cells. This system uses a gain-in-weight (GIW) batching method in which the material resides in the scale hopper until the precise weight, combination of materials, or both is achieved. This type of scale weighing system can typically achieve weigh accuracies of  $\pm 0.5$  percent of the full scale capacity, including material and hopper weight. Once the desired weight has been achieved, a valve at the bottom of the hopper opens and the material is discharged to the process below. This system is ideal for higher volumes of material, such as major ingredients, when precise ingredient accuracy isn't as critical. In this system, ensuring optimal efficiency means making sure that the material is free-flowing and moisture-free, which prevents buildup in the pneumatic line, valve, or hopper. In some cases, vibrators can be used at the end of the batch process to help release the material from the scale hopper, but if the material packs easily, external vibration can also cause the material to pack on the hopper walls and not release the proper batch amount.

*Gain-in-weight batching using volumetric feed devices.* GIW batching can also be achieved when volumetric metering devices sequentially feed multiple ingredients into a collection hopper mounted on load cells. Using bulk-and-dribble feeding ensures higher accuracy. Once all the ingredients have been delivered, the batch is complete and the mixture is delivered to the process below. One advantage to this method is that several feeding devices can be used for different ingredients. However, each feeder operates sequentially, resulting in a longer overall batching time if you have multiple ingredients. Another advantage to this method is that it provides greater batch accuracies than GIW batching using scale weighing because of the greater control over ingredient delivery to the weigh hopper.

*Loss-in-weight batching using gravimetric devices.* If you require high accuracy for the individual ingredients, low overall batching time, or both, then loss-in-weight (LIW) batching will be more efficient. In this method, gravimetric feeders operating in batch mode simultaneously feed multiple ingredients into a collection hopper. Each of the feeders is on load cells or scales, and the material lost from the feeder is weighed. Since all of the ingredients are being delivered simultaneously, the overall batch time is greatly reduced. Additionally, the system's highly accurate load cells specifically sized for the individual ingredient batch weights increase batch accuracy. This method is often used for more expensive microingredients. However, it should be noted that this system could also be more costly, because each feeder requires individual weighing devices.

*Combination systems.* Many times, a combination of the GIW and LIW batching can be used to make the overall batching operation more cost-effective. GIW batching techniques are used for the macroingredients, and separate LIW feeders are used for the microingredients, whose batch weights may be too small to be detected by the GIW scale hoppers.

Once you've chosen your batching technology, you can integrate several efficiency-enhancing design options into the system, including easy-access and easy-clean support devices and frames, quick-disconnect systems, and even wash-in-place features that allow for quick product changeover and cleanability. It's important to discuss all options with the batching system manufacturer to ensure that you'll have the most efficient overall batching operation.

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Generally, investigating and determining a batching system's operating efficiency should start with a thorough review of your material's characteristics, including particle size and density, and your application's requirements, including batch amount, delivery frequency, and allowable time for that delivery. Next, inspect and appraise existing equipment to ensure that it's appropriate for the application and material. Is it oversized, undersized, or in need of repair? Are the operators properly trained to maximize the efficiency that adding new industrial controls would provide? These are just some of the primary issues you should address to begin the process of improving your batching system's operating efficiency.

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