

Bye Bye

Bakeries and snack manufacturers looking to improve automation, information management and process control should investigate continuous mix systems.

BY SHANE WHITAKER

Does each of your mixing operators believe he or she is the best ever, tweaking mix times, adding water or changing other variables to create perfect doughs? And while each of their doughs may be fine, they may end up requiring further fine-tuning downstream to ensure the final baked foods are within the company's specifications. And when the next shift takes over, additional modifications will need to be made as the next mixing operator makes their ideal dough, leading to waste as operators adjust equipment to process the different doughs.

If your batch mixing operation is experiencing this or similar consistency problem, continuous mixers may be the answer. Continuous mixing is "a verifiable series of steps, automatically sequenced, that produces a continuous stream of high-quality dough. Repeated all day, identically and automatically," as defined by Jim Warren, director of mixing system sales for Reading Bakery Systems, Robesonia, PA, the parent company of ExACT Mixing.

On the other hand, he described batch mixing as "a series of steps an operator takes, in precise sequence, intending to produce a single batch of high-quality dough. Repeat as needed — identically — all day."

Mr. Warren added, "Continuous mixing offers a consistent, uniform dough stream to a production line at the same rate that it is being used. This permits more consistent dispersion of ingredients, a uniform dough all day, simpler dough feed equipment and tighter control over the entire process."

GREATER CONTROL. Automation, information management and process control are three benefits that while



complicated to achieve with batch mixing are relatively simple with continuous mixing, according to Mr. Warren.

In regard to automation, ingredients are fed into the continuous mixer automatically and at accuracies difficult to obtain in a batch process. "Even minor ingredients can be delivered at accuracies of $\pm 1/2\%$," he said. "In some cases, continuous mixer users have been able to reduce levels of minor ingredients because they are delivered more accurately and dispersed more evenly."

In addition, records are collected concerning all aspects of ingredient metering, and this information gathered by the metering system is used to determine that the dough is correct even before it is mixed, according to Mr. Warren. "This moves quality control from the end of the process, a lag indication, to the front of the process, where it can be used more proactively," he said. "This also has significant implications for cost savings eliminating bad doughs, inconsistent products or packaging room inefficiency. The information can also be used for inventory control and real-time yield measures."

▲ The clam-shell barrel is a new feature to this continuous mixer, allowing greater access for sanitation, as well as process evaluation.
EXACT MIXING, A DIVISION OF READING BAKERY SYSTEMS

As far as process control, Mr. Warren stated that not only are errors eliminated, but the dough is always the same age when processed downstream. “This eliminates inconsistencies from beginning to end of a batch such as darker baked product or shifting piece sizes because of changes in dough density.”

In addition to these, Mr. Warren offered other advantages of continuous mix systems such as manpower reduction, improved consistency of product and packaging room efficiency, better ingredient dispersion and more uniform use of electrical energy.

Stephen Marquardt, product manager for Codos, the continuous kneading system available from Reimelt Corp., Odessa, FL, commented about the energy savings companies could realize using Codos. “The energy costs are much lower than compared to a batch mixer,” he said. “We are talking up to 30% energy cost savings because we separate the process into a mixer and a kneader”

Bakeries also can realize ingredient cost savings with continuous kneading, according to Mr. Marquardt. “The Codos system premixes raw materials and adds all dry ingredients in first stage with water and fats,” he said. “There is a perfect hydration of the flour during mixing, and the efficient mixing process leads to an increased water absorption of 1 to 2%.”

AUTOMATING INGREDIENTS. Continuous mixing requires higher levels of automatic ingredient handling than is necessary for batch mixers. “The level of automation required is normally a function of the customer’s budget, the process requirements and line outputs,” Mr. Warren said. “But in general, higher levels of ingredient automation deliver better results in terms of labor savings, product consistency and product uniformity.”

Because they require automated ingredient handling, the initial cost for continuous mix systems can be greater than with batch mixers. However, Mr. Warren pointed out that the cost of the continuous mixer is comparable to that of a horizontal batch mixer making a similar amount of dough per hour.

Additionally, Mr. Marquardt noted that the majority of companies looking at continuous mixing already have bulk material systems for flour that can be easily integrated with the new Codos system. And if a company doesn’t want to invest in an automated ingredient handling for minor and micro ingredients, he suggested a semiautomatic system by which an operator would manually scale ingredients and add them to a bag dump station that would then feed the premix hopper where these ingredients will be mixed with the flour. A loss-in-weight feeder would then supply continuously the dry ingredients to the first stage of the mixer. It is also possible to add shear-sensitive products such as raisins and chocolate chips at the end of the kneading process.



▲ Hydrated dough is discharged from the first stage of the continuous mixing system and rests for approximately two minutes on the travelling conveyor before entering the second stage of mixing.

REIMELT

Mr. Warren said, “ExACT Mixing recognizes the importance of automated ingredient systems and actually offers these systems as part of a turnkey solution. This is generally a more affordable alternative than separating these functions among vendors. And the control systems can be simpler for the operators to grasp and use effectively.”

However, he noted that automation also can be added in phases. “In the interest of capital costs and flexibility, some areas can use manual intervention such as blending bags of dry ingredients in a ‘batch’ while the other areas such as liquid delivery are automated,” he said. “Yet the dough mixing process itself remains continuous and consistent.”

DIFFERENT STYLES. Like batch mixers, various models of continuous mixers are best suited to specific products. ExACT Mixing offers three styles of continuous mixers, and each is available in five to six different sizes.

It manufactures a low-shear, high-development mixer that Mr. Warren described as a kneading and stretching mixer ideal for bread and bun doughs. “On the opposite end of the spectrum, we have a high-shear, low-development mixer,” he said. “The shaft is turning much faster, and you get cutting. You most likely would see this mixer in a snack application, making potato- or corn-based snacks.”

Both of these mixers feature a single-screw to work the materials within the trough; however, a third style is a twin-shaft mixer that is much more versatile and works well in either the baking or snack arena, according to Mr.

IT ALL STACKS UP



REDUCE LABOR
INCREASE PRODUCTIVITY
QUICK R.O.I.



EASY KEYPAD SELECTION
WASHDOWN READY
MULTI-LANE STACKER
INDEPENDENT LANE COUNT
SMALL FOOTPRINT
PAPER
INTERLEAVING



WAFFLES • PANCAKES
PIZZA CRUST • PITA BREAD
COOKIES, ETC.



Warren. "Although it is more versatile, it is for mid-range mixing, and it doesn't get to the very end of high shear or of high development."

The Codos system is separated into two parts, and each section features its own tools defined for a special task. Spiral shafts are used in the beginning to ensure thorough mixing of the raw materials. Helical kneading tools perform the kneading of the dough, and the speed of the kneading tools control the specific energy input into the dough.

Reimelt completed a lot of R&D on the mixing and kneading tools, the motors and the other elements of the mixer and kneader, since acquiring the core technology 15 years ago, according to Mr. Marquardt. This has resulted in a mixing system in which the biochemical processes are immediately initiated and minimizes stress on the dough development during kneading.

The Codos system is actually making a great number of small batches, he said. "We push the dough forward while kneading it, and small dough quantities move through the system, not a big chunk like in a batch mixer," Mr. Marquardt explained. "So you don't heat the dough as much as in a batch mixer, and we add the energy systematically into the dough, which we need for optimum dough development." The kneader features a double-jacketed trough that can be heated or cooled to easily achieve the desired dough temperature.

Processors can also change quickly to another product using Codos. Because of the small quantities in the mixing and kneading trough, a quick recipe change is possible, according to Mr. Marquardt.

ExACT Mixing always starts with the desired output of the process line and how much minimum and maximum dough it will require when determining which system will work best for a manufacturer, according to Mr. Warren. Output capacities for its continuous mixers range from 200 to 19,000 lbs per hour.

One thing processors need to keep in mind is that the turndown rate on a continuous mixing system is somewhere around 50% without changing anything



▲ Continuous mixing systems generally require a smaller footprint than batch mixers making the same amount of dough per hour.

EXACT MIXING, A DIVISION OF READING BAKERY SYSTEMS

on the system, according to Mr. Warren. For example, if you have a continuous mixer that can produce 16,000 lb per hour and is feeding four lines, at a minimum it would need to produce 8,000 lbs, meaning that you would have to have two of the four lines running at all times the mixer is in operation.

Mr. Warren said, "Continuous mix systems almost always have a smaller footprint than batch mixers. This is particularly true as a system becomes higher in capacity. Furthermore, continuous mix systems often have lesser floor-loading requirements than large batch mixers."

ExACT's mixers feature clam-shell barrels for improved access for sanitation or process evaluation. Although the clam-shell cannot be opened while the shaft is running, processors can study the development of their doughs by looking at the material throughout the process. "Because the dough is moving through the mixer, you always have, at entry of the mixer, totally unmixed dough, and at the end, you have completely mixed dough," Mr. Warren explained. "You can see all phases in between."

SANITATION AND MAINTENANCE.

“Continuous mixers require less maintenance and are easier to clean,” Mr. Warren said. “Typically, continuous mixers have few moving parts, and these parts turn at relatively slow speeds resulting in less parts wear.”

One of the biggest complaints

customers had with ExACT’s mixers during the 25 years it has made continuous systems was that they couldn’t see everything inside the mixer, and although they were easy to clean, it was difficult to inspect to see that it completely sanitized. That led to the development of the clam-

FORMOST FUJI

www.formostfuji.com



- Servo Drive Overhead Option
- Easy Clean Drip Pans
- Improved Discharge Guides
- New Overhead Door Frames
- Rotary Bag Feed Option
- Compact Logics Controller
- Color Touch Screen
- Fixed Operator Control Box



GTS BAGGER
425-483-9090

For more information, see Page 129



▲ This continuous mix system is divided into two parts. The spiral shafts above are used in the first stage to thoroughly mix the raw materials, and below are helical kneading tools that assure gentle handling of the dough without shearing or cutting.

REIMELT

shell barrel four years ago, according to Mr. Warren.

The Codos mixer and kneader features a lid on top so processors have total access to all mixing tools, Mr. Marquardt said. The components also are mobile, so sanitation crews can move them into a washing zone and high-pressure wash them if desired. This can be accomplished in less than 10 minutes, he added.

Mr. Marquardt also noted that the maintenance is less because the stress factor on the tools and bearings is distributed and minimized more than compared to a batch system.

Continuous mixers seem to be gaining acceptance throughout the baking industry. And although it is still a small percentage of the overall mixing market, continued innovation will lead to a growing presence in mixing rooms. ■