

Consistency = Quality

Bakers looking for efficiency and consistency in their operations should consider continuous mixing systems.

BY KIMBERLIE CLYMA

Bakers have to consider all the pros and cons when investing in new equipment — every machine isn't ideal for all operations. While one mixer may be perfect for making one particular product, it might not be best suited for producing another. Before making a capital investment in new mixing equipment, especially in these economically challenging times, bakers must weigh all the options. In many scenarios it is prudent to compare batch versus continuous mixing systems.

When considering these two mixing options, Jim Warren, director of mixing systems sales for Reading Bakery Systems, Robesonia, Pennsylvania, USA, says it's like comparing stairs to an escalator. "Batch mixing is like walking up a flight of stairs, and continuous mixing is like taking the escalator," he said. "Both get you to the same final destination but with batch mixing you have to go one step at a time and put in more effort; with continuous mixing, it's just a steady flowing process."

Batch mixing operations can experience consistency problems as a result of human error or operator modifications. The goal of batch mixing is for the operator to take a series of steps, in precise sequence, with the intent of producing a single batch of high-quality dough. The operator then repeats this process for subsequent doughs until a product changeover. In contrast, according to Mr.

Warren, continuous mixing is

a "verifiable series of steps, automatically sequenced, that produces a continuous stream of high-quality dough; repeated automatically until directed to stop.

"Continuous mixing offers a consistent, uniform dough stream to a production line at the same rate that it is used. It provides consistent dispersion of ingredients, simpler dough feed equipment and tighter control over the entire mixing process," he added.

The initial capital cost of a continuous mixing system is more than a batch system because there are more automated elements. However, after the initial expense, the operation cost is similar to a batch mixer, and the paybacks can be higher, according to Mr. Warren. Paybacks of continuous mix systems include improved product quality and reduced waste and manpower.

AUTOMATIC BENEFITS. The paybacks of a continuous system go hand in hand with its primary benefit — automation. While many batch mixing systems can be automated to some degree, continuous systems are automated by nature. Because it's an ongoing process there is less dependence on the operator. Ingredients are fed into the continuous mixer automatically and at accuracies that are difficult to achieve with a batch mixing system. Even minor ingredients are delivered at high accuracy levels.

The Peerless Group, Sidney, Ohio, USA, offers its automated slurry mixer and continuous mixer, made by its Fedco division, which are ideal for cake batter mixing. Cake ingredients are fed automatically into the slurry mixer. "Therefore, once the

batter is mixed, it is never again touched or handled," said Matt Zielsdorf, vice-president, sales and marketing at Peerless. "This yields greater labor savings as well as increased safety because mixing bowls do not need to be moved or lifted."

The Fedco slurry mixer blends cake batter into a uniform, un-aerated premix that is then fed to the holding tank to feed the continuous mixer. The continuous mixer aerates the batter for unsurpassed consistency, uniform cell structure and precise specific gravity, according to Mr. Zielsdorf.

The Peerless system also offers the benefit of lower energy costs because of its mixing tooth design. "We offer pyramidal teeth that are proven to reduce the heat transfer during aeration. Our mixing 'tooth' design is much stronger than that of the pin-like mixing teeth on certain models," he said. Reduced heat transfer to the product results in less wasted energy.

The Codos system from Reimelt GmbH, Rödermark, Germany, also lists energy reduction as one of its benefits. The company claims its system offers up to 30% energy cost savings by separating the mixing and kneading processes.

A dry ingredient preblender is installed upstream of the mixer that produces a premix. A gravimetric ingredient metering system monitors the continuous feed of all recipe components, including liquids. In the primary mixer, the two interlocking helical tools carefully, homogeneously mix all ingredients of the dough with optimum wetting. This in turn starts the biochemical process. At the discharge end, the mixed ingredients transfer to the kneader. The resting time on the transfer belt improves the dough development.

The next stage of the Codos system enables targeted kneading with energy input controlled by the speed of the tools, which ensures smooth handling of the



◀ This mixer is ideal for use with lower-moisture, wheat-based doughs.
READING BAKERY SYSTEMS



▼ This continuous mixer is mounted to a common base plate with a holding tank.

PEERLESS

product without cutting. The double-jacketed construction of the kneader minimizes temperature fluctuations in the dough. Another advantage is the fact that the mixer remains open. This supports the optimum sequence of the biochemical processes for dough development and also permits easy addition of particulates.

REVIEWING RECORDS. In addition to automation, information management is a benefit that is oftentimes complicated to achieve with batch mixing but relatively simple with continuous mixing systems.

“Continuous mixing processes are monitored by the system. You can record the parameters, so they can be reviewed at any time,” Mr. Warren said. “With batch systems you can look back at what was supposed to have happened, but there are chances for human error.”

With continuous mixing systems, information management records all aspects of ingredient metering. This information can be gathered and analyzed during operation to determine dough quality, instead of waiting until the end of the mixing process as with other systems. “This has significant implications for cost savings by eliminating bad dough before it is further processed. The information can also be used for inventory control and real-time yield measures,” he said.

The control systems for the Verymix continuous mixer from VMI, Montaigu, France, allow for traceability of raw materials and mixing parameters as well as logs for each production run. The formulation of recipes, dosing, planning, monitoring guidelines and

traceability are all managed from a supervisory touch screen.

SYSTEM VARIATIONS. Like batch mixers, various models of continuous mixers are best suited to specific products. The challenge comes when a particular product has never been produced using a continuous system. “This can lead bakers to be apprehensive in investing a continuous mixing system. Many say, ‘I haven’t seen it done with my product, so how will I know if it will work?’” Mr. Warren said. “But for other manufacturers, trying something that hasn’t been done and being a pioneer is appealing. Some feel it gives them a competitive advantage.”

Regardless, bakers considering new mixing systems have numerous styles to choose from. Reading offers three styles of its ExACT continuous mixers, and each is available in five to six different sizes.

The company manufactures a low-shear, high-development mixer that Mr. Warren described as a kneading-and-stretching mixer ideal for bread and bun doughs. “We also have a high-shear, low-development mixer,” he said. “The shaft is turning much faster, and you get cutting. This mixer is popular for snack applications, making potato- or corn-based items. Whereas a low-development mixer may turn at 20 or 30 rpm, the shaft in this mixer may rotate at 200 to 300 rpm.”

Both these mixers feature a single screw to work the materials within the trough; however, a third style is a twin-shaft mixer that is more versatile and works well in either baking or snack operations, according to Mr. Warren. “Although it is more versatile, it is for mid-range mixing and doesn’t achieve high shear or high development.”

Reading will be introducing a new continuous mixer model at this year’s IBIE show at Las Vegas, Nevada, USA, in September.

VMI offers its Verymix and its BiMix mixers. The Verymix is equipped with constant weighfeeders, an independent arm and a kneading arm mixer optimized for each type of production. The BiMix, which produces between 200 and 8,000 kg of dough per hour, consists principally of a mixing cylinder divided into sections in which specific mixing tools are inserted. Each section is independently equipped

with a double jacket allowing liquid circulation to control dough temperature. Die plates can be used to introduce friction lost in the system and thereby increase the shearing and dispersion pressure.

The continuous aerating mixer, or CAM, from Tonelli Group, S.p.A., Parma, Italy, is suitable to aerate and emulsify any product that requires even structure and increased volume. This occurs through the combined action of a stator precision coupled to a rotor, both provided with whipping teeth. The stator is jacketed to allow forced circulation of cooling water.

According to the company, the newest additions to this mixer include production capacity improvement brought about by interchangeable heads that switch according to the preprogrammed recipe. The system can handle a wide range of products because of the different lengths of heads that are built into the system. Sanitation is easy because the rotor and stator are constructed out of a solid stainless steel block.

SANITARY DESIGNS. “We offer the most sanitary design available,” Mr. Zielsdorf said. “We have redesigned our machines to significantly reduce the amount of water needed to clean them. Our slurry mixers offer a shaft seal that has proven to be watertight—thereby protecting the drive motor and gearbox.”

Because of the low number of moving parts, the Codos system requires low maintenance and is resistant to wear. There is also less stress on the tools and bearings, which reduces equipment maintenance. Also, cleaning — as a matter of routine or in case of a recipe change — can be carried out quickly and easily. The mixer and kneader feature a lip on top so processors can have total access to all the mixing tools. The mixers are mobile so sanitation crews can easily move them if full washdown is required.

Continuous mixing systems already have a strong presence in European bakery operations because the technology has been around longer. But there is a growing trend toward using continuous mixing versus batch systems in the US and other parts of the world. And as exposure to the features and benefits of continuous mixers increases, more bakers will consider this method when the need arises. ■