

Automated dough preparation

FOR INDUSTRIAL DOUGH PRODUCTION, THE RIGHT MIXER AND ITS INTEGRAL FEATURES ARE CRUCIAL FOR THE RELEVANT DOUGH MAKE-UP PROCESS

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++ figure 1

+ In practice, the processing steps such as dough discharge, dough transport, controlled dough feed into the dough divider are often underestimated. This can result in logistical idle time in the production cycle, in different dough maturity and dough structure, and too long an ageing or developing of the skin. All this can lead to quality deviations of the final product.

In this way advantages gained by optimum mixing will be lost due to non-optimum dough management. The dough management process which begins right after dough preparation is rather work-intensive and susceptible to production errors. Therefore to ensure technologically safe and trouble-free industrial dough production, automation and computer-controlled processing sequences are important requirements.

How much automation?

The level of automation in dough preparation and dough management is mainly dependent on the required line performance. The profitability limit for automation processes starts with an hourly dough output of about 1,000 kg, with a decreasing tendency.

Criteria for the selection of a fully automated mixing plant:

- + required dough output of the line (in kg dough per hour)
- + type of process applied (recipe, type of dough management, dough resting time, dough proofing)
- + number of employees required, their knowledge and availability
- + space available
- + price

Solutions for automation of industrial dough preparation and management

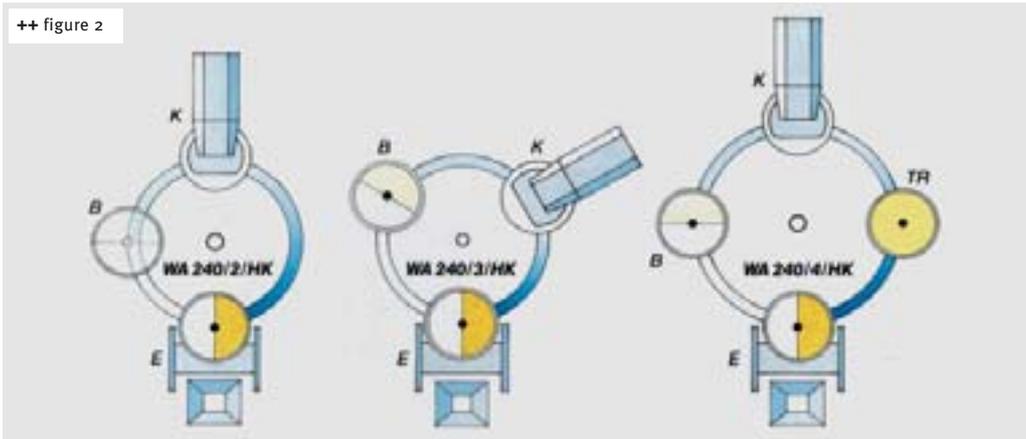
Only a very few manufacturers of mixing equipment also offer complex solutions for automated dough production and management. It has been found in practice that batch mixers are more flexible in terms of recipe handling and cleaning. Therefore, most industrial mixing lines are based on batch mixers. Nevertheless, dough prepared in a batch mixer is continuously fed to the dough dividers located at the end of the automated line. Continuous mixers are used for mono-products or production with only a very few recipe changes.

Basic variants of industrial dough production

Diosna, the established manufacturer of mixers, offers four basic types for industrial dough production:

- + Carousel principle
- + Mixer with dough discharge at the bottom of the vessel
- + Linear transport system
- + Continuous mixer

The carousel principle has been used successfully for over 30 years. The carousel is a proven solution for an automated dough production plant. Here the vessels are aligned on a circular path, and during the entire cycle time, the vessels remain at a specific station: dosing, mixing, resting or discharge. The number of vessel stations is limited to a maximum of 6. This makes the carousel principle suitable for direct dough preparation or preparation processes with short resting times.



++ figure 2

++ figure 1
Diosna SP 160 E

++ figure 2
Carousel scheme

The carousel's performance is dependent on the mixer used. For wheat dough the maximum is 3,000 kg, and for mixed rye doughs it is 5,000 kg per hour.

Diosna mixer with automatic dough discharge at the bottom facilitates work, even in a restricted space. This Diosna mixer gives bakeries of all sizes the chance of higher hourly capacities while keeping all processing steps precisely as they were. The first mixers with bottom discharge were developed by Diosna in the early 70s. This makes Diosna the most experienced company in this field and the company which also offers the broadest product range in this sector. For more than 35 years, mixers carrying the Diosna logo have been operating successfully in several hundred mixing plants. They feed bread lines (up to 70% rye is possible), lines for small wheat products as well as laminating plants.

With Diosna mixers with an automatic dough discharge through the bottom center, dough production can be realized even in the most confined space. From loading to quick mix-

ing, discharge, dough resting and dough transport, depending on the requirements, e.g. hourly performance, dough recipe or available space, different types of mixers and different sizes are available:

- + Spiral mixer with bottom discharge in two variants
- + Double spiral mixer with bottom discharge
- + Proven Diosna Wendel mixer with bottom discharge

After the mixing vessel has been completely emptied, the dough is quickly and immediately transported with stainless steel wagons or via conveying belts. On belts, a dough resting time of up to 40 minutes can be maintained. If the dough is discharged into another vessel, the mixers can be integrated into a computer-controlled dough resting system. This system is, in particular, recommended for products with pre-ferments or very long proofing times.

The most important benefits are a compact design and the precise compliance with all processing steps. Advantages of Diosna mixer with bottom discharge: ▶



++ figure 3

++ figure 3
Diosna mixing plant
WA240-2/5/HK300



Dr. Daniel Gerbel (46)

Born in 1960 in Puchov, Slovakia, Dr. Daniel Gerbel studied Bakery and Pastry Technology at the Institute for Food Technology in Moscow. He started his professional career as production manager in the state-owned baking company

Bratislava Petrzalka before his conferral of a doctorate at the Technical University in Dresden, Germany. In 1989, he started working as export assistant for Technopool AG in Bratislava and then in 1990 transferred to Diosna Dierks und Söhne GmbH in Osnabrück, Germany, as process engineer and sales manager for Central and East Europe and Scandinavia. Since 1998 he has lived and worked in Bratislava for Diosna in the same capacity. Dr. Gerbel is considered to be one of the most experienced experts in the field of mixing and kneading applications. E-Mail: drgerbel@euroweb.sk +++

- + automated dough production from feeding the raw materials to quick mixing, discharge, possible dough rest and dough transport
- + suitable for companies of all sizes producing between 1,000 and 5,000 kg dough per hour
- + suitable for 160-400 kg dough per batch
- + significantly easier operation with more uniform doughs
- + optimum mixing process for differently sized batches
- + quick recipe changes
- + dry, uniform doughs – ideal for further processing
- + easy cleaning
- + programmable operation with manual intervention



++ figure 4



Dipl.-Ing Konrad Böert (52)

He is one of the most faithful Diosna employees. After his apprenticeship as the producer of mixers in Osnabrück, Germany, he studied mechanical engineering at the University of Applied Sciences in Osnabrück, Germany, which he finished

with a degree in engineering in 1978. Today, he is the head of project management at Diosna. +++

Linear transport system – convincing automation engineering

The optimum solution for large craft bakeries and industrial baking companies due to its tremendous performance and high efficiency. The linear transport system consists of a robot which automatically transports the vessels to the respective stations.

Stations of the linear transport system:

- + dosing/feeding of raw materials
- + mixing
- + dough rest
- + discharge

The process sequences of the individual movements are individually programmed for each production profile. The special feature of the linear transport system is the location of the guide rail from above which allows maximum floor clearance and optimum cleaning. The individual vessels are moved to the individual stations where they are placed at floor level to allow for manual interference if needed.



++ figure 5

++ figure 6



++ figure 4
Diosna SP 240 E

++ figure 5
Diosna Linear Transport System

++ figure 6
Diosna ContinoMIXX

The Diosna linear transport system at a glance

- + automated dough production from feeding the raw materials to quick mixing, discharge, dough rest and dough transport
- + suitable for all types of dough
- + individual cycle, with or without dough rest
- + optimum space utilization
- + bowl stations can be placed on all four sides as the robot can turn around
- + different types of mixers in the same system
- + designed for up to 16 batches per hour
- + quick dough change, up to 6,400 kg/h
- + quick recipe changes
- + different dough resting times in the same system
- + feeding of several production lines simultaneously is possible
- + manual operation possible
- + future automation of existing Diosna mixers possible

For all automation solutions for industrial dough production and dough handling, the compliance with the technological discipline, which is the precise keeping of all processing steps, is important. The control's computer manages all production sequences and thus saves on personnel. However, the main part of any automated mixing plant was and still is the mixer itself.

The right selection, reliability and quality determine the performance and effectiveness of the plant as well as the production efficiency and end product quality.

Continuous mixing plants

Diosna's continuous mixing plants are in particular suitable for high performance produc-

tion lines for mono-products or for lines which require only very few recipe changes. This system is used for the production of challenging wheat and mixed doughs. The performance ranges from 250 to 10,000 kg dough/h.

The dough production is divided into two phases which is induced by an optimum technological process sequence.

Phase 1 is the efficient mixing and hydration of the raw materials in a separate horizontal trough. Two asymmetrically operating mixing tools reduce the mixing phase and feed the mass to an opening in the bottom situated at the end of the trough.

The second separate trough in which the second phase of the dough production will take place is connected to the first trough by a steep conveyor. It is also possible to add excess dough from the production line (e.g. from the laminating plant or a pizza line) easily at this conveyor. Dough kneading is highly efficient and energy-saving due to the specific geometry of the tools.

The Diosna ContinoMIXX plant distinguishes itself by its very high degree of efficiency.

Besides the very high performance, the utilization of the optimum water absorption capacity of the dough and a low dough heat-up are among the most important advantages of this mixing system. Both product containers are made from high-quality stainless steel, and a double-jacketed cooling device is available as an added option.

The downstream production line is supplied continuously with fresh, optimally mixed dough at defined feeding pressure in the quantity required. +++