

Fundamental for process quality [Part 2]

THE LAST PART OF THIS SERIES WILL INFORM ON PRECISE AUTOMATIC AND MANUAL WEIGHING OF INGREDIENTS AND THE HANDLING OF LIQUIDS



++ figure 1

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++ figure 1
Vacuum weighing system

++ figure 2 (right page)
Azo Componenter, circular
arrangement

++ figure 3 (right page)
Azo Componenter, linear
arrangement

✚ The physical management of raw materials from storage, transportation and dosing is not solely a field where many companies may discover streamlining potential. It also decides to a certain extent on processing and product quality.

Many components are possible

Recipes are becoming more elaborate. They consist of an ever increasing number of components. In this case vacuum weighing systems are predestined because one destination can be reached with many pipelines. Compared to that a weighing process using the pneumatic conveying technology and special vessels is less favorable. Because the weight ranges of the components to be handled are quite different, the trend is to allocate certain lines to different weight classes. For feeding a mixer, a vacuum weighing system is often used for bulk components in the weight range above 50 kg, a second vacuum weighing sys-

tem is employed for medium components in the range between 20 and 80 kg and a third one for components needed in smaller quantities between 2.5 and 50 kg. As the vessel sizes are properly adjusted to the respective electro-mechanical weighing system, the preciseness increases even in smaller systems because the cross-section of the pipelines can be kept smaller as well. In the case of special requirements it might be reasonable to allocate the vacuum weighing systems to certain lines. If contamination has to be prevented, special feeding systems have to be used. Furthermore, it must be taken into consideration whether minor ingredients are pre-weighed and then fed to a combination weighing system.

Automatic and precise weighing of ingredients and small components

For the automatic handling of ingredients and small components, a system consisting of small silo plants has proven to be successful. Here



all the ingredients are stored in containers arranged either parallel to each other or in a circle. The respective amounts are removed from these silos either automatically or manually. The circular version of the COMPONENTER® system by Azo is an economical solution for the automatic weighing of up to eight different ingredients. This system allows parallel weighing with high batch frequency (up to 40 batches per hour) of ingredients for which a possible contamination is allowed. This concept can be allocated to certain lines (e.g. light and dark products). Each component has its own discharge, metering and scale. This allows for a quick and parallel operation and the feeding of several mixers or mixer lines at the same time. All ingredients scales are arranged in such a way that they discharge their weighed quantities into a combination container. From here the components are transported by vacuum to the weighing system and discharged into the mixer. Depending on the properties and feeding characteristics of the ingredients it seems reasonable to provide for a premixing in the combination vessel prior to the pneumatic feeding process.

If more than eight ingredients and minor components are to be processed, a linear design must be used. Storage containers can be Big Bags, container discharge sections, feeding hoppers for sacks as well as pneumatically loaded separators with discharge and metering units arranged in rows opposite to each other. With a certain configuration, it is also possible to fill the hoppers from a central aisle or externally. Here again, each small component or ingredient has its own discharge and metering. Depending on the recipe, the additively weighed ingredients are collected by a linear traveling collection scale and discharged to one or more mixers or pneumatic feeding systems. The ingredients are directly weighed into the large bowl of the traveling scale or in the case of the highest precision, pre-weighed in the respective weighing bowl and transferred to the combination bowl.

Currently a new system for storage and metering of small components is hitting the headlines. It is a DosiBox® system



with integrated metering which can be also used as a reusable container. The box can be removed from the system and kept in storage until it is to be used again. In the meantime another box holding a different product can be hooked up to the system.

Linearly arranged DosiBox containers in combination with the mobile docking and weighing station DosiDock® yield the so-called DOSINENTER®. With the combination of DosiBox containers and the respective handling system DosiLogistic® automation of a number of powered small components and ingredients becomes possible.

Operator-controlled manual weighing of ingredients and small components

If minor quantities and ingredients such as flavorings which due to their physical properties or their use requirements (amounts and frequency) cannot be economically metered automatically, an operator-controlled manual weighing center is the system of choice. This is because such small components in particular may not be added to the baking process without proper monitoring and documentation.

A modular program system based on a client server structure allows all requirements to be met from a simple weighing terminal to a control system including recipe management, quality assurance and documentation. The operator-controlled weighing process is color-coded and displayed on a large monitor at site. The software runs with Microsoft Windows NT and is thus available for all PC platforms from the computer in the office to the workstation computers in all production areas. No more than three scales with different weighing ranges are connected to one workstation. A printer supplies material consignment notes which even include bar codes on paper or on labels. A bar code reader is used for raw material identification. Depending on the application, the weight can be displayed in ascending or descending order. Large nominal values are displayed as a bar chart which also indicates the tolerance range in color. ►



++ figure 4

++ figure 4
Manual weighing station



++ figure 5

++ figure 5
Weighing station for high
viscosity oils

Fully automatic weighing

If more convenience and complete automation is required, a clocked variation of the Componenter is available. This version is an optimum solution for weighing many different ingredients with high batch frequency. Instead of the linearly traveling combination vessel, bar coded containers are used. The containers move by steps underneath the metering stations and automatically collect the weighed small components, which are accurate to the gram. It is also possible to allocate an individual recipe to each container.

Handling of liquid components

Bulk quantities delivered by tank trucks are stored in horizontal or vertical tanks, in containers and drums. These vessels can be heated or insulated, depending on the nature of the raw materials stored in them. The mixers can be loaded either volumetrically via flow meter or much more reliably via gravimetric weighing systems. If needed, the feeding pipelines can be insulated and heated. For liquids that flow easily such as water and similar fluids, additively operating weighing systems are used. These are container weighing systems in which the liquid components are precisely metered and weighed via coarse / fine metering valves. As an alternative a flow meter can be used. As soon as the respective quantity is metered into the scale, it is transferred to the subsequent mixing process. Fats and poor flowing oils are warmed and then filled into negative weighing systems. The liquids which do not flow easily are then negatively weighed

in the system. Their discharge is often supported by a pneumatic system. When using gravimetric systems, one can be sure that all liquid components are fed to the mixing process in the right quantity and with the right weight. Convenience water mixing and dosing systems allow volumetric metering of municipal water, ice water and hot water which can then be fed to the mixing process via liquid weighing systems as well.

Automatic feed of yeast, sponge dough, sourdough, soaker and hot soaker doughs

Grains and cereals are filled from hoppers or Big Bag stations into containers for the preparation of soakers and hot soakers via automatic feeding systems.

The same is valid for the yeast preparation vessels where powered or granulated yeast is filled from the respective discharge stations. Any additions to the mixer can be done volumetrically or gravimetrically as described above. It is recommended that the yeast solution is pumped via insulated pipelines.

Regulation (EC) No 178/2002

Regulation 178/2002 EC promotes the close relationship of process technology and process information technology. Starting with raw materials received and production up to shipping, all processes and results must be available for monitoring purposes. Such streamlined and complete detection is only reasonably possible with an IT supported information chain from the ERP system and connected search systems. +++

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