

The dosing of raw materials: automatisatisation and flavour

A family-run company, CEPI designs and manufactures turn-key systems for the storage, conveying and metering of raw materials, as well as fully integrated automation and technologies for production

Fragrance, taste and integrity: an automatised management of dosing processes and raw ingredients not only ensures efficiency but is the best choice for producers who wish to achieve a final product of high quality and unique flavour. Controlling parameters such as temperature, pH and atmosphere is necessary to preserve the properties of the ingredients, and an automated recipe is accurate and constant, leading to repeatability and high volumes of uniquely tasting food.

Case in point: a key factor in the production of baked products is the temperature of the dough. This requires an automatic dosing system and technologies that reliably manage it. Automatising the dosing system eliminates human error, ensures precision and constancy in the process, reduces consumptions, powders and pollution and improves working conditions. Pairing up with a partner that can provide flexibility

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as well as continuity, customisation and all-around expertise, production lines will become more linear and rational while achieving natural, healthy and aromatic products that are pursued by modern markets.

The design of the dosing system needs to fit the needs of each individual process, based on information that goes much further than the purely technical but

involves all departments from warehouse to marketing. It should include technologies that can improve the management of the raw materials and avoid intrusive processing, and be managed through personalised operator panels, and software for full traceability and warehouse management.

CEPI’s fermentation systems lead to a fragrant, digestible product while



standardising procedures and allowing for full control of all processes, their flour cooling technology allows for the correct and linear management of dough temperature that is essential in bread-making, and cold fat dosing stabilises temperatures and preserves the organoleptic characteristics of ingredients such as butter. These are only a few examples of how CEPI protects the materials handled by their equipment.

How to design a dosing system

CEPI builds around 300 custom installations every year, focusing on the specificity and diversity of each installation and adapting or developing technologies according to their needs. This approach results in constant research and innovation leading to unparalleled technological range. Similarly, every project is built around the development of close relationships with the customer through an ongoing conversation that involves all aspects of the project from analysis, to engineering and control, manufacture, installation and service.

Bulk-handling is not just about silos. Designing a dosing system is a complex process that requires a close analysis of the customer's processes. With repeatability, traceability and precision in mind, detailed information is needed about raw materials and consumptions, building evaluation, humidity and temperature effect and cross contamination, as well as other concerns such as sustainability. The customer's experience during this process is rarely discussed but for a project to be successful, the ability to fully involve them before and during planning is fundamental.

What is the role of the customer? What is the best way for them to gather the information needed to develop the best automation system? Firstly, we must remember that the bulk-handling system isn't marginal. While roughly the planning involves three main stages (ingredient analysis, the study of where to install the equipment and connection with production), there is a crucial preliminary phase that fully illustrates how the automation of the dosing must be connected with all company's activities: not only production and technical, but warehouse, purchasing and marketing.

Why the marketing team? Because a projection of future productions should always be kept in mind to design a system that can be easily adapted or expanded in the future. This information is easily available within the company but the customer is not often encouraged to use it in the context of their bulk-handling system. CEPI does it.

This vision extends to all the planning. The three stages mentioned above are not happening in a linear way one after the other but are interdependent. Because of rich food technology expertise, CEPI will of course ask all relevant technical questions regarding the materials, recipes and batches. But the customer needs to be fully accompanied and supported through their analysis of the ingredients by someone who not only knows their properties, but understands how to manage all kinds of related concerns, for example in relation to the way they are received (bulk, bags, barrel, IBCs and so on.) It will help not only to match them with the most suitable dosing process, but to identify critical ingredients, technological advantages and saving opportunities. The building evaluation and connection with production need the same kind of overall view of the entire production, even small processes. When planning a new line, not only all the elements (bulk-handling



system, mixer, packaging) must be taken in consideration and planned in parallel, but all future opportunities should be kept in mind.

Technologies: some examples

As well as building a customised automatic dosing system, CEPI offers fully automated technologies designed to preserve the quality of the ingredients.

All storing solutions can be equipped with a fluidisation system that allows for chronological extraction with FIFO logic, greatly enhancing the traceability process. The flour oxygenation operated by the fluidised bed leads to a crucial improvement in the quality of the flour, with a faster but natural maturation that improves the flour's rheological properties without using additives. Fluidised flour is much better for breadmaking, with better responses to all treatments from dough preparation to fermentation. The dough is more elastic and easier to work. It absorbs water more easily and keeps gas in more easily during leavening. Bread made from

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well oxygenated flour is softer thanks to a more alveolar product, and more digestible as oxygenation allows for longer leavening.

Also essential in bread-making and similar processes is a correct and linear management of the dough temperature. Seasonal changes cause considerable variations to the temperatures of work areas and raw materials, impacting leavening times and creating unevenness in the finished product. CEPI offers a centralised cooling system for a gradual and automatic reaching of set temperature, based on the direct exchange of pre-cooled air through a fluidised bed. With constant temperature of flour in the mix the final product is constant all year round. Cooling agents not only add unnecessary costs to your process but lead to instant decreases and unstable temperatures through time. The progressive cooling of the CEPI system guarantees stability, precision and homogeneity in the dough.

Meeting the highest standards of precision and repeatability with a perfect control of physical parameters, CEPI's fermentation technology produces healthy, natural and aromatic products with long shelf life such as rye, wheat and multigrain breads. The technology spans from fermenters, to yeast melters and bread re-work dissolvers for liquid sponge, rye and wheat sourdough while saving space, manpower, additives and yeast. It allows full process automation, and full interconnection with the storing and dosing systems of other bulk materials and liquids.

Cold fat dosing stabilises temperatures and preserves the organoleptic characteristics of ingredients such as butter. Metering in paste form achieves a product that is easier to amalgamate with the dough, and is especially suitable for the production of biscuits, cakes and other confectionery. It

also ensures time saving, higher hygiene in the storage and production rooms and accurate metering due to absence of air in the pipe.

The three in one (weighing, filtering, blending) weighs the ingredient, separates the air from product during pneumatic transport and at last blends, all in a single unit. The vertical blender inside is a system for the production of premixes that can be used across a wide range of food sectors (bakery, confectionery, ice cream, pasta and cereals only to name a few). It is fast, accurate and clean, creating a homogeneous mix of powders even for quantities lower than 1%, in the span of a few minutes. It can be done in the mixer in a single solution or by loss of weight in small batches. The blender is fully automated and optimises mixing and production times, as the blend is already homogenous before reaching the mixer.

Integrated automation

CEPI provides a turn-key system that includes the automation. Hardware and software design is done completely in-house, offering production management

through touch panels and software for full traceability and warehouse management.

CEPI's touch panels can be fully customised and are developed across multiple platforms including Siemens, Rockwell and Codesys. They handle recipe creation and management, ingredient and hopper parameterisation, synoptic overview with real time status and maintenance of utilities with manual command, loading of silos and other stations, and any other functions like washing and climatisation.

Each automation system is the result of a decades-long history of synergic development alongside the mechanical side. With a team of 24 designers and programmers working on automation and software design, CEPI provides technical and human continuity through the development of a project that can become highly specific and complex.

CEPI is ready for the fourth industrial revolution: the system is interconnected and can exchange information. Their solutions provide full horizontal and vertical integration, managing dialogue and data among our devices and those of other partners operating in the lines, after the dosing and before the raw ingredients management. All their data can be easily integrated with global ERP to achieve organisation-wide traceability. They can generate important information for not only for the production departments and management, but for departments such as Quality Control (lot usage information for each raw material) and Purchases (schedule of raw material purchase, spare part purchase).

