

The dosing of raw materials: CEPI's method

In this article, Stefania Montalti explains how to design a dosing system that is turn-key, easily expandable and circular, delivering a final product of high quality and unique flavor.

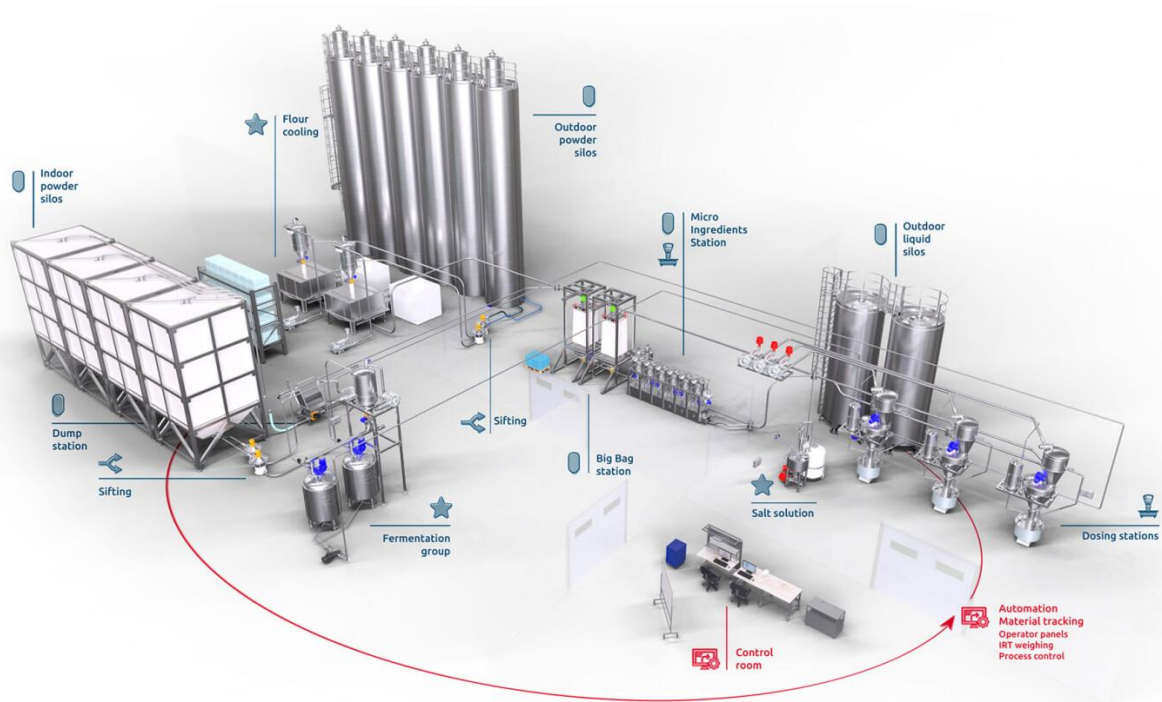
Stefania Montalti is Communications and Content Manager as well as Sustainability Strategy Coordinator in CEPI. In her role managing communications, she has developed a cross-cutting expertise in messaging and the facilitation of dialogue, which she is currently channeling in the communication of key sustainability concepts such as circularity. Stefania is interested in promoting a clear and transparent understanding of both environmental and social aspects of sustainable development, with a general audience in mind as well as a specialized, industry one.

Why an automatic dosing system

Fragrance, taste and integrity: doing the automation of your dosing processes the right way not only ensures efficiency but is the best choice for producers who wish to achieve a final product of **high quality and unique flavor**. Controlling parameters such as temperature, pH, atmosphere is necessary to preserve the properties of the ingredients, and an automatized 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. Our automated systems **eliminate human error, ensures precision and constancy in the process, reduces consumptions, powders and pollutions and improves working conditions**. Pairing up with a partner that can provide flexibility as well as continuity, customization 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 personalized operator panels, and software for full traceability and warehouse management.



With almost **40 years** of experience in the handling of raw materials for the food industry including, CEPI can fully meet each of these needs. Not only do we put **flexibility** and **customization** at the center of our work, but all of our technologies are developed factoring the preservation of flavour and ingredient properties, and they fit the **circular economy**.

CEPI's **fermentation** systems lead to a fragrant, digestible product while standardizing procedures and allowing for full control of all processes, our **flour cooling** technology allows for the correct and linear management of dough temperature that is essential in bread-making, and **cold fat dosing** stabilizes temperatures and preserves the organoleptic characteristics of ingredients such as butter. These are only a few examples of how we protect the materials handled by our equipment.

How to design a dosing system

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, cross contamination and 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**.



Dosing group

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**. Due to our **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.

CEPI is known for this kind of **elastic thinking**, and it is also one of the reasons we innovate so much: the desire to fully understanding the process and to then support it with a system that matches it translates to a **pretty much constant evolution** of the technology and expansion of the range.



Circularity

Our goal is to provide **turn-key, highly customized** solutions that manage the production line **from storage to dosing**. Turn-key is one crucial characteristic of our installations, and the other is **organic**: storage, dosing, conveying and their automation must be regarded **in their totality**, and in the way they **interact** with each other. This is crucial to achieve effective customization, which in turn is what makes installations very **durable**.

As you can see, we take a **long-term view** when we design our systems, in order to create the most flexible solution for each food manufacturer, one which does not preclude any new path they may take in the future. Because our **method** is organic and involves all departments (from warehouse, to production, technical, purchasing and marketing) it includes projection of **future productions** and makes our installations **very easy to adapt** to any new developments.

One of our strengths is the ability to bring new life to installations that would otherwise be decommissioned. This activity, known as **revamping**, makes it possible to extend the useful life of the plants indefinitely: systems that we built **30 years** ago are still functioning efficiently.

The choice of basing our working model around being turn-key has been strategic. It makes users independent and meets their specific needs, and very importantly, it ensures that their process is **efficient and sustainable**, providing them with a durable installation that **fits with the circular economy model**.

Technologies: some examples

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

All storing solutions can be equipped with a **fluidization 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 well oxygenated flour is **softer** thanks to a more alveolar product, and more **digestible** as oxygenation allows for longer leavening.



Indoor Trevira fabric silo with fluidized bed

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 **centralized cooling** system for a **gradual** and automatic reaching of set temperature, based on the direct exchange of pre-cooled air through a fluidized 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 produce **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 stabilizes 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 **vertical blender** is a system for the production of premix 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 dose in the mixer in a single solution or by loss of weight in small batches. The blender is fully automated and optimizes mixing and production times, as the blend is already homogenous before reaching the mixer.



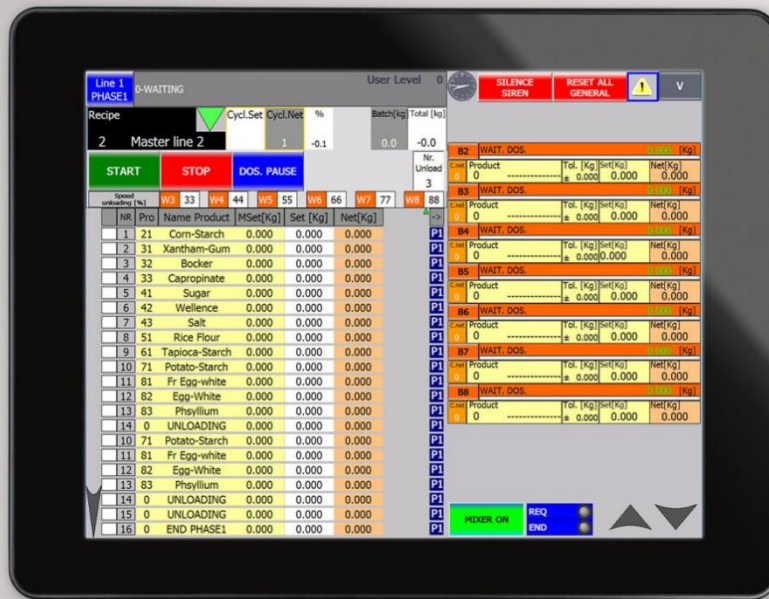
Three dosing lines with vertical blender

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 customized and are developed across multiple platforms including Siemens, Rockwell and Codesys. They handle **recipe** creation and management, ingredient and hopper **parametrization**, 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 climatization.

Integrated software **Cepi Tracking System** provides complete traceability including **control and digitalization of all ingredient movements**, lot control with barcode system and warehouse management, greatly enhancing food safety and the optimal management of related alarms. Receiving and visualizing data from the touch panels managing the production, Cepi Tracking System creates a history of storing and recipe production operations, providing **production analysis** with statistics of ingredient consumption, batch report with deviation analysis, stock visualisation and dynamic graphics illustrating product, recipe or lot trends.



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. Our 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 our data can be easily integrated with **global ERP** to achieve organization-wide traceability. We 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).

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