

Optimization of Process in Product Manufacturing

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EDITORIAL

Milk is the largest segment in food market and milk drink is still the highest consumed dairy product in the world, followed by butter and cheese. Dairy products are considered as a part of the healthy diet and different nations have recommendations for daily milk or dairy products intake. Thus, the dairy product consumption is rising globally.

The growing consumption brings pressure to the industry for more enhanced processes. Dairy processors focus on quality, compliance with product safety regulations and hygiene in the process. Efficient raw material usage with proper waste management system ensures cost and resource efficiency. Sustainability is an increasingly important focus area and with suitable process monitors, optimization and measurement tools manufacturers can more easily meet their targets on sustainability, use material efficiently and reduce waste. Accurate process measurements can increase dairy processing profitability and yield with accurate process measurements.

Various dairy processing procedures

Milk consists mainly of water, fat, proteins, lactose (milk sugar) and minerals (salts). The residue, when water and gas are removed, is called the dry matter (DM) or total solids (TS) content of the milk. Industries are using several processing procedures for dairy products, such as:

Evaporation and drying

Evaporating milk to higher solids content and dried to powder makes the product lighter in weight, easier and cheaper to transport as more product can fit into a smaller space. Powder's shelf life is also longer, and the product is easier to handle and ship as pathogens usually require moist or wet conditions to develop. Thus, milk powders are the most traded agricultural commodities globally.

Milk is also evaporated to a certain extend when it is processed into condensed milk or sweetened condensed milk. All of these operations need tight evaporation control, and a common measurement scale is Brix or total solids (TS) measurement.

Total solids and product identification

Fresh milk, usually packed in milk cartons, has a lot of product options, varying between fat-free skim milk to whole milk. Due to its short shelf life this product is more of a local commodity. In the manufacturing, all fat is first removed from the raw milk and then added back according to legal standard and recipe. This processing step is called standardization, and this is a critical step as each nation has different regulations on the composition of milk.

Homogenization is a common step after standardization, and it reduces the fat molecules into such a small size that they do not rise up and create a creamy layer on top of the milk. When producing fresh milk, the producers want to measure the total solids content (TS) accurately and in-line to meet the legal standards and to create products while creating minimum waste. Fast milk product identification in-line enables better yield, leading to savings to producers by minimizing product waste and prohibiting product mixes and expensive product recalls.

Infant formula

Baby milk is a synthetic version of breast milk designed to be used as an additional alimentation or as a substitute to fulfil an infant's nutritional needs. Producers want absolute certainty in hygienic conditions as well as in product safety while protecting the nutritional value of the product. In the manufacturing process, total solids (TS) measurement is a critical measurement for any infant formula manufacturer.

Product blending and flavouring

Milk, dairy, yogurt, ice cream and alternative milk products might be blended with jam, flavors and syrups to create delicious commodities. The correct and accurate blend is essential in this process.

Measuring the process with Vaisala's refractometer

In addition to the tight process control and hygienic process conditions, accurate and reliable measurements from the process are required for better profitability as well as clean, safe and familiar tasting food, made precisely according to a recipe.

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Vaisala's solution for the dairy production process optimization is the Sanitary Process Refractometer PR-43 system, which consists of a compact or probe refractometer and a graphical user interface bringing ease of use into play. The refractometer can be also used as a stand-alone device. Different user interface options range from rugged to a compact lightweight and a web-based version, and

allow the user to select the most preferred way to access and use the refractometer measurement and diagnostics data.

The measurement of the refractometer is not affected by bubbles, particles or vibration. The hygienic design has 3-A certificate and the product can handle cleaning-in-place (CIP) and sterilization-in-place (SIP) operations. The refractometer covers the full Brix range 0-100%.