KPM

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Quality Control in a Cereal Plant

APPLICATION BRIEF

Breakfast cereals represent over $30 billion dollars annually in the global food market and are a significant part of food purchases around the world. This food segment includes cold and hot cereals and cereal mixes. Traditional flakes and baked shapes compromise much of the market, but allergen-free mixes, health conscious nuts and dried fruits are becoming more common.

The breakfast cereal market is highly competitive markets where brand loyalty and consistent product quality can result in increasing market share and concomitant production and distribution efficiencies. Consistent product quality and efficient production are keys to a successful product.

PROCESS CONTROL ANALYSIS POINTS IN A CEREAL PLANT

For traditional cereals, Incoming wheat, corn, or rice is cleaned and cooked in large tanks of boiling water or steam to soften the kernels. The ingredient is then sent to a shredder or flake press where it is manipulated into its final shape. The material is then conveyed through a large flow-through oven for baking. Additional flavorings, such as frosting or sugar, can be added before packaging.

There are multiple points in a cereal plant where quality measurements can help control the process, saving money and improving consistency and quality including:

- Raw material testing to verify supplier integrity and ingredient quality
- Monitoring moisture at oven exit
- Monitoring and controlling sugar, frosting, or other ingredients sprayed onto the cereal

SpectraStar™ XT Series NIR Analyzers, shown above, offer outstanding accuracy and reliability for rapid compositional analysis of solid, slurry, or liquid samples.

WHAT IS NIR ANALYSIS?

NIR analysis is a proven technique that provides simultaneous results for moisture, protein, fat, fiber, ash, and other parameters in under a minute. Applications for cereal production can include the analysis of both the raw ingredients as well as the finished product which enables optimization of the process from start to finish.

The speed of analysis allows 100% measurement of incoming ingredients and finished products. Raw ingredients suppliers can be verified to ensure they are providing quality materials, ensuring production and product consistency and reducing re-work and discard costs. Final products can be monitored to ensure product quality and optimize the manufacturing process.

VALUE PROPOSITIONS FOR NIR IN CEREAL PLANTS

Moisture Control: The most common analysis point for cereals is at the oven exit. Controlling the moisture levels for the final products is critical for product quality. Elevated moisture affects the texture and mouth feel of the product, and can also have an adverse microbiological and product stability effect if not controlled. Over drying the product can also affect the palatability of the product and increases drying and ingredient costs. NIR analysis at the oven exit provides almost instant feedback to the plant operators allowing them to adjust the oven temperatures and optimize the moisture levels, usually within 0.5%. The result is more consistent product quality, lower energy and ingredient costs, and less out of specification product. In many plants, controlling moisture alone can result in a payback time of less than 6 months for a SpectraStar analyzer. In the case of dried fruits, the payback time can be a couple of months.

Sugar Coating Monitoring: Many cereals have sugar or other coatings applied to the product after the oven. Often this is the most expensive ingredient and is also on the nutritional label. NIR analysis of the finished product provides instant verification of the proper application of the sugar coating.

Raw Ingredient Monitoring: Incoming raw ingredients such as flour and corn, as well as whole grains like wheat, corn and rice can be highly variable in composition and quality, and yet many manufacturers do little quality control of these ingredients. Critical ingredients can be analyzed for protein, moisture, ash and other parameters to ensure consistent quality from the raw materials. Quality monitoring of raw ingredients will produce more consistent products and reduces re-work and discard.

ABOUT THE SPECTRASTAR™ XT SERIES NIR ANALYZER

From analyzing moisture, protein, fat, sugar, and fibers, to more complex parameters such as ash, fatty acids, and lignin, the SpectraStar™ XT NIR Analyzer Series is trusted by thousands of quality laboratories and production facilities to enhance their processes and make data-driven decisions.

- Obtain vital quality parameter data in about 30 seconds, enabling quick response for quality control.
- Access an extensive library of robust calibrations developed from hundreds-to-thousands of samples. Calibration customization is also available.
- Minimal sample preparation, only minimal training required, and environmentally friendly.
- Available with KPMLink™, a cloud-based software suite to support the real-time remote configuration of product settings, calibrations, and more.

Ready-to-Use SpectraStar XT-R Calibrations for Cereal Manufacturers			
SUBSTANCE	**CONSTITUENTS**	**SAMPLING ACCESSORIES**	**PART NUMBER**
Breakfast Cereals Combo	Moisture, Sugar, Fat, Salt	US-LGOP-0001 Large Open Cup with plunger	APPS-CALB-146
Cinnamon Oat Cereal	Moisture	US-LGOP-0001 Large Open Cup with plunger	APPS-CALB-160
Colored Fruit Cereal	Moisture, Sugar, Fat, Salt	US-LGOP-0001 Large Open Cup with plunger	APPS-CALB-129
Corn Flakes	Moisture, Sugar, Salt	US-LGOP-0001 Large Open Cup with plunger	APPS-CALB-107
Nut and Grape Cereal	Moisture, Sugar, Salt	US-LGOP-0001 Large Open Cup with plunger	APPS-CALB-130
Nut Nugget Cereal	Moisture, Sugar, Salt	US-LGOP-0001 Large Open Cup with plunger	APPS-CALB-131
Raisins	Moisture, Glycerin, Oil	US-LGOP-0001 Large Open Cup with plunger	APPS-CALB-145

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