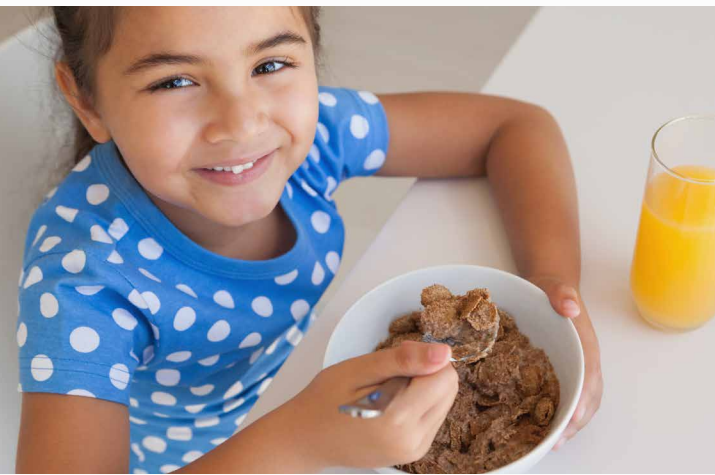


## QUALITY CONTROL IN A **Cereal Plant**

### Introduction to the Market



### Quality Control in a Cereal Plant

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 comprise much of the market, but allergen-free mixes, health conscious nuts and dried fruits are becoming more common.

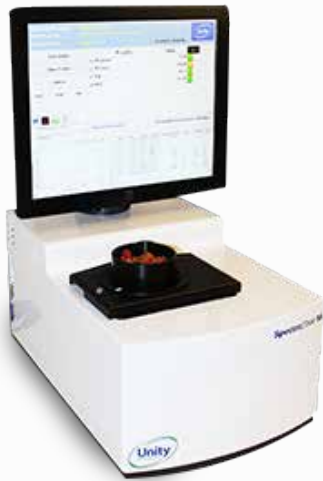
The breakfast cereal market is highly competitive markets where brand loyalty and consistent product quality can result in increasing market share and concomitant production and distribution efficiencies. Consistent product quality and efficient production are keys to a successful product.

### 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 on the cereal

QUALITY CONTROL IN A **Cereal Plant**


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 Proposition

### 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.



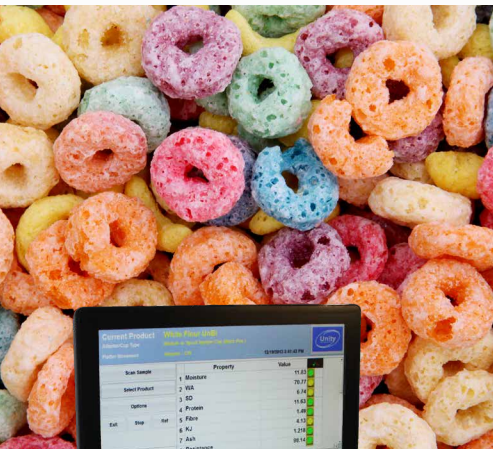


## Unity Solutions to this Industry



### Cereal Plant Solutions

Unity Scientific offers a variety of ready-to-use solutions tailored to the cereal plant industry. All of our cereal analyzer packages start with the SpectraStar XL analyzer, an advanced, high performance at-line scanning monochromator. All SpectraStar XL models come standard with the following features:



- TRUE NIR™ Spectrometer for ultra-performance
- Advanced TRUE NIR detector and electronics for low noise and high repeatability
- 17" high resolution touch screen for intuitive, easy operation
- Fast Windows®7 computer with Solid State Drive for reliability and speed
- Sealed case for reliable operation at-line
- 5 W 10,000 hr lamp
- Unity Check Cell for daily performance validation



Unity Scientific offers its Food Analyzer packages in support of the cereal industry. As each product is unique, starter calibrations and complimentary calibration support for one year are included to ensure that the customer's unique products are properly analyzed. Unity Scientific has implemented hundreds of analyzers in support of cereal applications and has many starter calibrations to ensure quick implementation and validation of each system.

Unity Food Analyzers are based on the SpectraStar Analyzer, featuring a sealed analyzer case and touch screen operation ready for at-line process control in cereal plants. The food analyzer packages are offered in two configurations:

The **US-2500F0D1 Food Analyzer Package** includes The Feed Analyzer includes:

- SpectraStar 2500XL(Rotating) Spectrometer (1100 – 2500 nm)
- Large sample cups with plunger US-LGOP-0001
- Starter calibrations for your products (most snack food applications available)
- 1 year calibration development and validation support

The **US-2500F0D2 Food Analyzer XLR Package** includes The Feed Analyzer includes:

- SpectraStar 2500XLR(Rotating) Spectrometer (680 – 2500 nm)
- Large sample cups with plunger US-LGOP-0001
- Starter calibrations for your products (most snack food applications available)
- 1 year calibration development and validation support

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