Fonterra's Australia Dennington Overhauls Standardizing System

Better compositional control of milk powder products with a Pavilion8® solution

Challenge

Minimize the giveaway of protein and fat while remaining compliant with codex standards.

Solutions

A Pavilion8® model predictive control (MPC) in-line standardizing system creates a much more agile and capable operation.

Key Benefits

- 49% Reduction in Protein Giveaway
- (0.36% Protein Yield Improvement)
- ~78,000 kg of Protein Saved Annually
- 38% Reduction in Fat Giveaway (0.25 % Fat Yield Improvement)
- 58,000 kg of Fat Saved Annually
- ~NZ$ 47 per Ton Saving (average)
- >NZ$ 1,000,000 Benefit Annually
- 22% Reduction in Standard Deviation of Protein

Yield Optimization

- Reduced Out of Spec Product
- Reduced Component Give-Away
- Reduced Product Variability
- Reduced Testing Cost

Background

Fonterra Australia's Dennington site produces over 22,500 tons of milk powder products annually from 250 million litres of milk. A leading multinational dairy company, Fonterra exports 95 percent of their shareholders' production and is responsible for a third of international dairy trade across open borders.

Fonterra's global supply chain stretches from the farms of 13,000 shareholders in New Zealand to customers and consumers in 140 countries. Collecting more than 13 billion liters of milk a year, Fonterra manufactures and markets over 1.8 million tons of product annually, making them the world's leader in large scale milk procurement, processing and management, with some of the world's best known dairy brands.

The company operates some of the largest and most advanced processing facilities in the world, and is a recognized leader in the areas of research and development and milk quality. This commitment to producing high quality innovative products has earned NZMP a preferred supplier relationship with some of the world's largest and most demanding international food companies.

Challenge

The existing Batch Milk standardizing system presented many challenges for Fonterra. Batch standardizing introduced buffer times which were long and often difficult to manage. Batch processes are inherently inflexible and made it difficult to optimize for fat or protein yield in the final powder product as making corrections to the standardized milk were not accurate and became time consuming. Slow response to outputs meant that excessive product would be produced if an adjustment was made that sent the product out of spec.

The Intelligent Standardizing Solution

The standardization solution was implemented in two phases. First, the replacement of the existing batch standardizing operation with an in-line system utilizing the FOSS ProcesScan™ FT was completed. Second, after giving the plant staff time to familiarize themselves with the new standardizing set up, a Pavilion8 MPC standardizing solution was deployed.

The Pavilion8 Model Predictive Control (MPC) Standardizing application from Rockwell Automation provides a closed loop standardizing solution with superior targeting of final powder composition and constraint management through real-time control of wet-side standardizing and process accurate inferential powder composition models.

By changing from a batch to an in-line standardizing system with the Pavilion8 MPC solution created a much more agile and capable operation. The time required for corrections made at the front end of the process to be seen in the finished product was substantially reduced.

This enabled plant staff to minimize losses due to component giveaway and helped with the consistency of performance, particularly at start ups of less frequent and small run length products.

Implementing a consistently capable process allowed production personnel to have confidence to target set points for fat and protein that were closer to the specification limit than ever before.

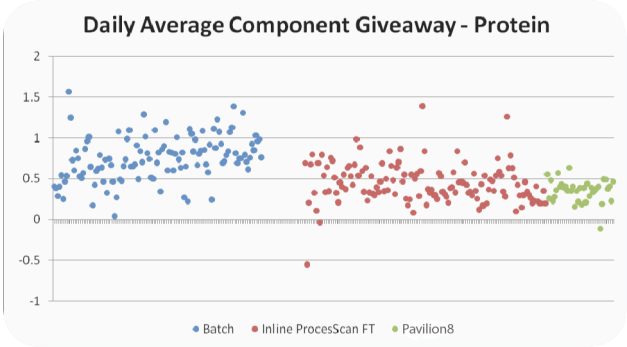
Key Control Results

Milk Powder Composition Control

The key measures of system performance improvement were protein and fat giveaway and standard deviation of composition. Component giveaway is defined as the average composition minus the specification limit. Low cost manufacturers target these specification limits to maximize their yield.

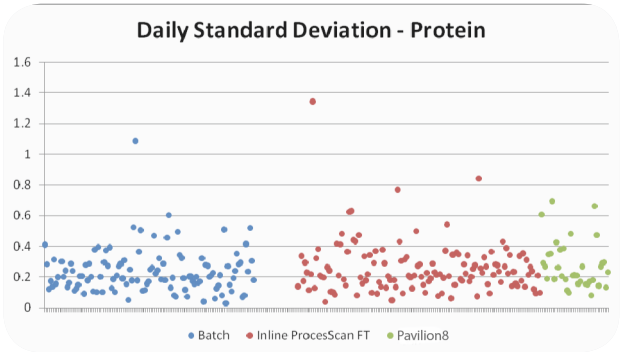
Protein Performance

There was a significant shift in protein giveaway when moving from batch to the Pavilion8 MPC standardizing solution. The total reduction in protein giveaway was 49%. This translated to savings of ~78,000 kgs of protein each year.



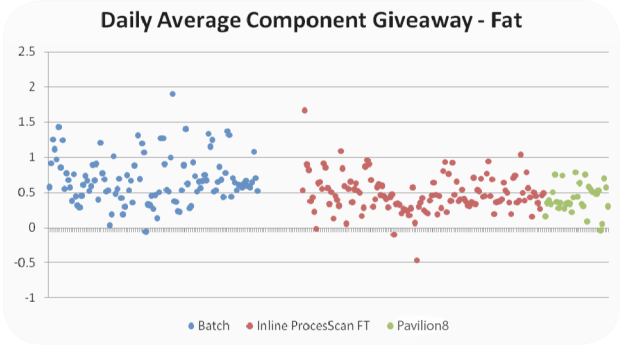
	Batch	Inline ProcesScan FT	Pavilion8
Average of Protein Giveaway	**0.713**	**0.441**	**0.365**
StdDev of Protein Giveaway	0.416	0.391	0.325

Standard deviation was also improved as a result of the upgrade with the installation of the Standardization Application. Standard deviation was reduced by ~22% when compared to the batch process. This is a particularly good result when you consider that all buffer tanks were removed in the upgrade (buffer tanks are very effective at reducing low level variability in a process). Decreasing the standard deviation of the results enabled the site to aim closer to the spec limit with increased confidence that it would not produce out of spec results.



Fat Performance

Fonterra also experienced similar results for giveaway of fat, with a total reduction of 38%; this translates into savings of ~ 58000kgs of fat each year.



	Batch	Inline ProcesScan FT	Pavilion8
Average of Fat Giveaway	**0.677**	**0.473**	**0.419**
StdDev of Fat Giveaway	0.440	0.413	0.447

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication RSAPCP-AP012A-EN-P – March 2016