



Case Study

Nutritional powder process optimization

Enhancing evaporator performance in powder manufacturing

Introduction

The processes of evaporation and drying of dairy powders offer significant opportunity and challenges at a commercial scale. Tight control of quality variables such as final powder moisture content is required whilst considering factors such as humidity and feed solids to deliver stable operation. Furthermore, there is often a trade off at start-up to ensure that the evaporator total solids content is within the safe levels for efficient operation of the dryer. This can result in significant overshoot and a lengthy period of time to achieve stable operation.

Controlling the variability in the solids feed is a significant factor particularly with a closely coupled evaporator / dryer arrangement as, even with a buffer tank, an excess of product being pushed through to the drying stage could perturb the dryer. In this situation it is vitally important to match the evaporator output with the dryer input capacity.

Advanced Process Control (APC) and optimization provides a solution to these challenges. By using dynamic Machine Learning models of the processes, the APC provides rapid stabilization of the process after initial start-up and improves dryer performance during routine operation.

Business Challenge

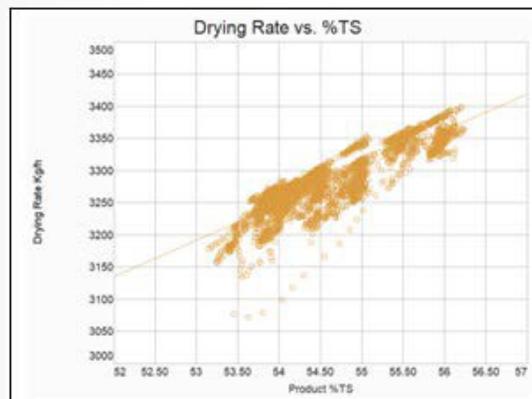
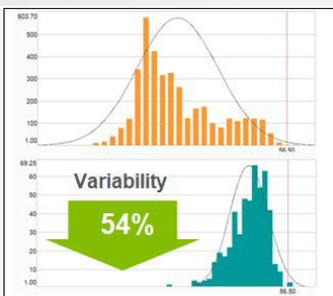
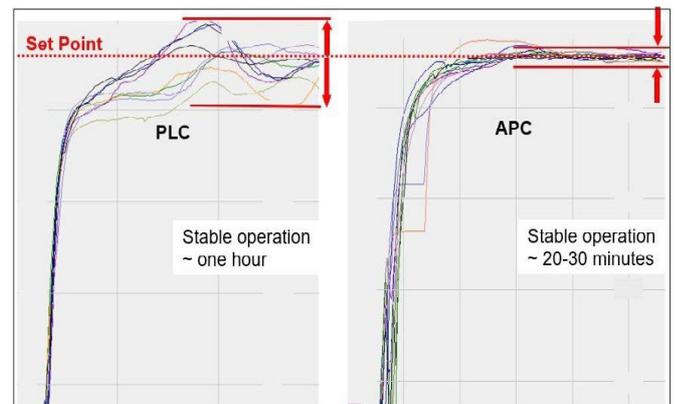
- Reduce overshoot after initial startup and the impact of feed disturbances
- Reduce the variability in product Total Solids
- Increase throughput of evaporator

Solution

- Control product multiple parameters including Total Solids
- Consider equipment and product limitations to avoid fouling
- Couple the evaporator and dryer together
- Automatically optimize throughput, Total Solids and moisture until the limitations of either the wet-side feed process, the evaporator or spray dryer are reached

Benefits

- Faster stabilization after initial start-up, delivering more robust manufacturing, quicker batch changes
- Reduced solids overshoot, reducing the risk of the evaporator fouling, and extending run times
- A significant (54%) reduction in solids variability, resulting in a more consistent feed to the dryer
- A stable uplift in total product solids, within the capacity of the dryer, enables an increase in drying rate of 5%



nutriMV

NutriMV has been developed to offer a real-time software solution for monitoring, controlling and optimizing the spray-drying process.

It is deployed worldwide in many commercial operations to manage product output to the right specification with the minimum amount of waste and energy usage.