Case Study
Spray Dryer
Advanced Process Control

Introduction

Emmi, a premier Swiss dairy company, manufacture a wide variety of dairy products. The focus of this project is optimising a spray dryer to increase powder yield. A key requirement for Emmi is that the Advanced Process Control System (APC) must robustly handle a wide portfolio of products on the dryer.

The dryer itself is a conventional multi-stage design with co-current air flow, internal fluid bed and external fluidised bed. Concentrate is sprayed into the drying chamber through nozzles.

Scope

- The scope of the project was to increase product yield
- Optimisation of the process also gives the potential for 3% increase in capacity on the dryer

Benefits

- Reduced process variability and tight management of equipment and process limits improves process capability. The key steps to enabling optimisation.
- Optimisation moves the dryer to a more economic operating point. This allows the moisture content of the powder to be safely raised, thereby increasing product yield.

Facts and Figures

- Moisture uplift = 0.2 %moisture
- Moisture variability within production runs reduced with APC
- APC also gives much more consistent run to run production
- T2 ***potential*** capacity increase of 3%.

Perceptive Solution

Optimisation of the dryer involves firstly reducing variability, thereby improving process capability. Variability reduction is a key enabling step. When the dryer is operating close to a limit on a key variable, for example powder moisture, such a reduction in variability is a significant result. With variability reduction comes the opportunity to increase yield, increase capacity, reduce specific energy consumption or a mixture of these objectives.

Case Study
Spray Dryer APC

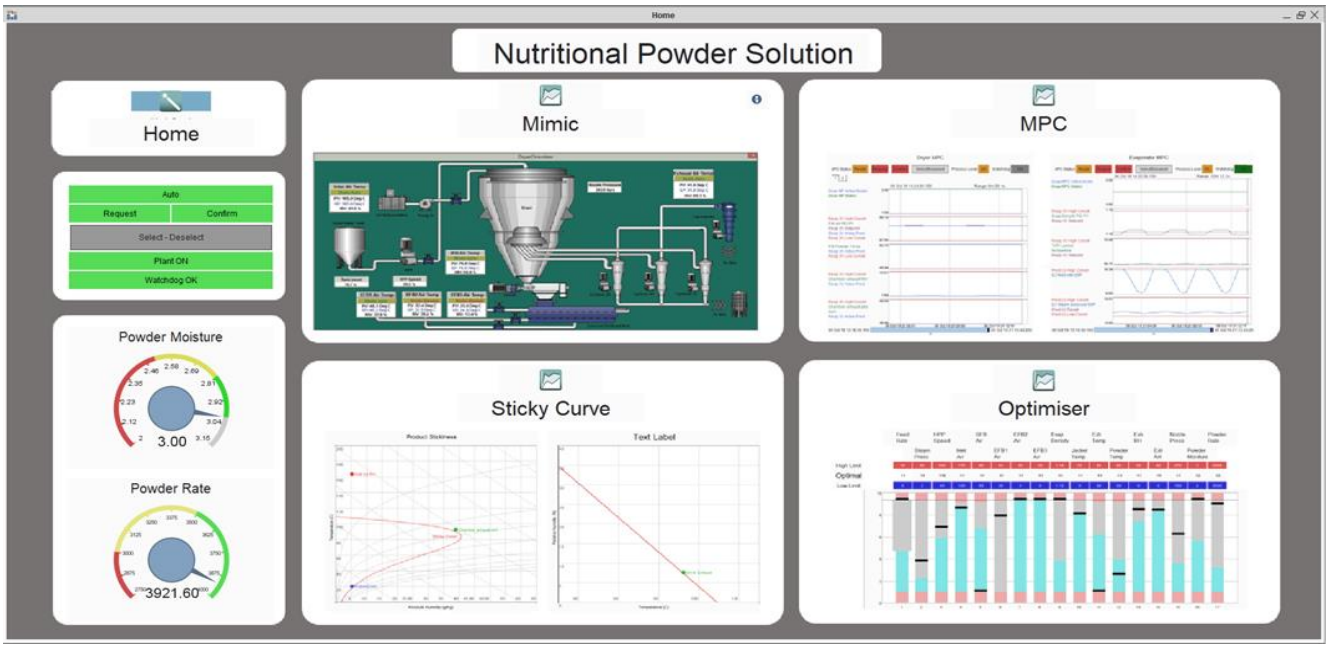
What We Delivered

Central to the solution is a digital model of the dryer. This describes the process input-output relationships, both in magnitude and dynamic time response. Advanced process control techniques then use the model to adjust multiple process inputs in a coordinated fashion.

Importantly, the control system is aware of constraints on equipment, the process and product quality, all of which have to be satisfied. The model enables the control system to deal with these requirements and make adjustments to multiple process inputs at the same time. The combination of a model with constraints is very powerful, providing a real world robust solution.

Implementation

Perceptive Engineering's NutriMV software is installed on a virtual / physical server, communicating with the plant automation system via OPC. A robust interface allows the APC to safely take control of existing control loops, adjusting set points typically every 5-10s. The process operator can interact with the APC via the existing SCADA or via the Dashboards that feature as part of the solution. A rich set of KPIs are calculated by the APC, providing insight into ongoing process and APC performance.



Return on Investment

The project has met the ROI target for the investment made by Emmi. According to Emmi's Project Engineer, "The project has been successful and now the APC is part of everyday operation. We also find that the APC dashboards give us valuable insight into production performance".