



Introduction

Corn wet milling involves the separation of corn into starch, fiber, germ and gluten. With a trend of increased production of value added corn based products, the demand and benefits of using extensive process monitoring and automation has become evident to the industry. Maintaining moisture and protein close to target in all process steps is essential to maintain operational margin. A leading food and feed additive supplier in China has installed four PerkinElmer DA 7300 In-line NIR instruments for use in two factories in China – one in Inner Mongolia and one in Xinjiang province. DA 7300 in-line measurements are used to control the refining of the Gluten slurry to Gluten meal.

Additionally, the group uses seven DA 7250 at-line instruments. The combination of at-line and in-line instruments allows the customer to measure all major intermediates – wet and dry – and end products in essentially real-time.

Rapid NIR monitoring of production allows tightening specifications, improving control and reducing waste. Greater product consistency leads to more satisfied customers and fewer claims. Automated measurement reduces need and therefore costs associated with lab sample analysis as well.

The integrated DA 7300 camera provides a live look into the process stream allowing operators to quickly ascertain process flow.



Figure 1. DA 7300 In-line.



Figure 2. DA 7250 At-line.

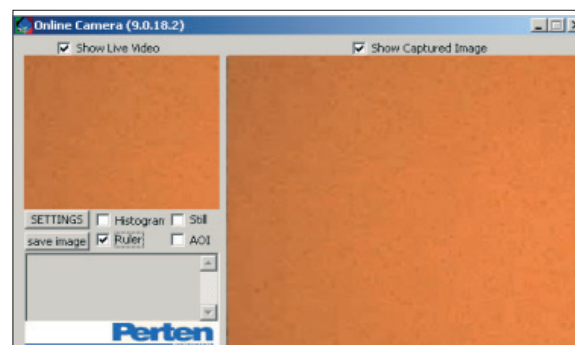


Figure 3. Live camera images from the process.

Installation Points and Measurement Control

In-line Measurement Control

The company has installed DA 7300 in-line units in the corn wet milling plants to control important process steps. The instrument has many mounting options making it very flexible as to where it can be placed in the process flow. Installations at this company range from monitoring liquid protein slurries to dried protein powder.

The unique optical configuration of the DA 7300 allows for reflectance mode measurements, instruments removing the need for product by-passes, slipstreams, or disruptive insertion of probes. The instruments meet sanitary design requirements, are IP65 rated, and can be cleaned in place.

Results are presented in a dedicated PerkinElmer interface and can be integrated into the plant control system via numerous external communication capabilities.

In-process Used NIR Calibrations

Since the DA 7300 and DA 7250 use the same optics, calibrations can be transferred between at-line and process instruments. This capability streamlines calibration development and maintenance helping to ensure accuracy and reduce workload.

Effect on Operational Results

In-line measurements from the DA 7300 provide substantial returns. Corn gluten meal is one of the most valuable products from the milling process as its price is based on moisture and protein content.

Real-time product information allows this customer to make adjustments to blends of the starch and gluten slurries, centrifuges, and dryers.

Without real-time process measurement, issues in starch separation may take hours to be discovered. These can lead to large quantities of out-of-spec protein in gluten meal. The added monitoring and automation has decreased variability in protein slurry, gluten powder, and thus yield. Additionally, a complete quality record of the entire production is available for traceability.

The additional protein powder yield and reduced lab analysis requirements provide extremely quick returns on instrument investment.

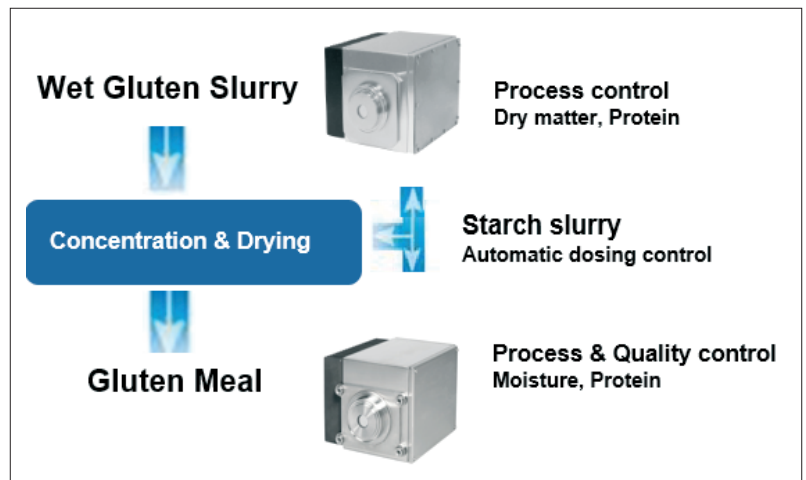


Figure 4. Need Figure info.

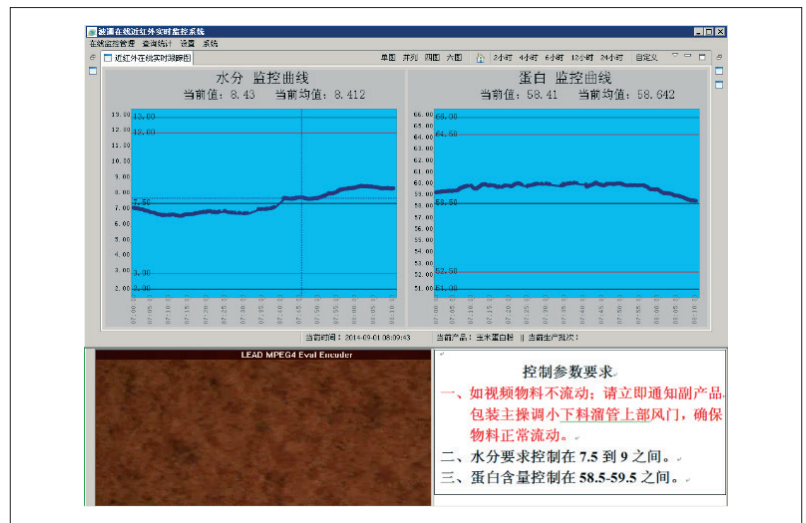


Figure 5. User interface with graphs and camera images.

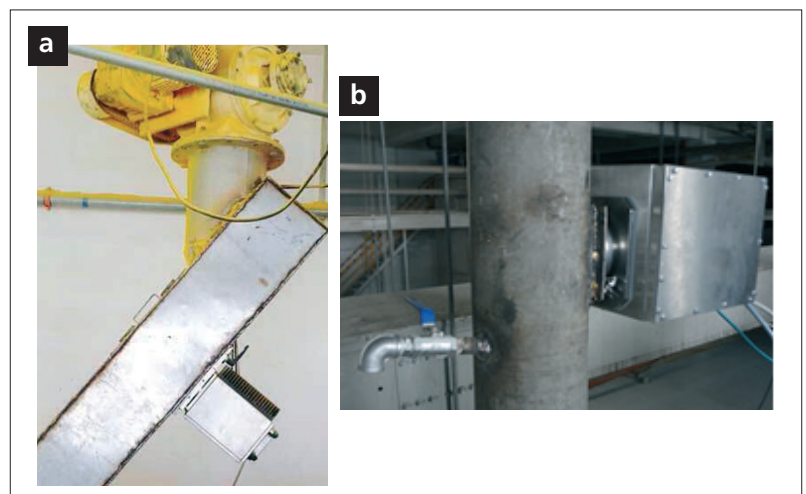


Figure 6. (a) DA 7300 instrument installed in a chute measuring meal, (b) DA 7300 instrument on a pipe, with a sample port opposite, measuring slurry.

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