



Profit increase in highly regulated dairy environments Real-time process control with NIR-Online sensors

NIR-Online® Schwarzwaldmilch ("Black Forrest Milk") has to fulfill kosher, halal, IFS, GMP and WHO standards

Abstract

Schwarzwaldmilch ("Black Forrest Milk") in Offenburg, Germany is far more than a typical dairy. Their product portfolio includes a variety of dried milk products ranging from skimmed milk powder to yoghurt and quark powder. All in full accordance with International Featured Standards (IFS) as well as strict kosher and halal regulations. Moreover, Schwarzwaldmilch (Fig. 1)



Figure 1: Schwarzwaldmilch ("Black Forrest Milk") in Offenburg, Germany.

cooperates with various pharmaceutical companies in order to dry excipients, enzymes or yeasts compliant to GMP and WHO. Production efficiency during drying is continuously monitored in real-time with NIR-Online sensors to achieve constant product quality and maximum gross profit margins. Approximately 80% of the annual production are already controlled via NIR-Online systems.

1. The art of drying

Schwarzwaldmilch's customers may define a multitude of parameters concerning their dried dairy products such as fat and moisture content of skimmed milk and whole milk powder. In case of yoghurt, quark or cream powder the fat mass percentage (which correlates to water content) is infinitely variable. Thus, to assure a reliable product quality the drying process has to be closely monitored.



Figure 2: Spray dryer at Schwarzwaldmilch with an evaporation capacity of up to 3000 kg per hour.

In a first step milk delivered from local farmers is separated to skim milk and cream with defined fat content and pasteurized. Based on final product demands skim milk and cream are mixed accordingly. Afterwards the mixture is subjected to vacuum evaporation followed by spray drying. A fluidized bed dryer adjusts the moisture level of the final product prior to packing or storage.

Non-dairy products such as aqueous yeast culture solutions are treated in a comparable manner with the notable exception of skimming.

2. When time is of the essence

The two main spray drying units (Fig. 2) with an approximate height of 20 m yield an overall water evaporation capacity of 3000 kg per hours. This gives rise to up to 3000 kg of dried powder per hour.



Figure 3: NIR-Online sensor installed at the bottom of a spray dryer. Monitored parameters include moisture and fat.

Samples from the spray dryers were taken every hour and subjected to two-fold testing. After an on-site assay, dried powder samples were collected and tested



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in the laboratory. If only 4 hours pass from sample collection to final laboratory results, up to 12 metric tons of dried material might need to be re-worked or are even lost.

Klaus Selck, Schwarzwaldmilch's Quality Control Manager, recalls "Laboratory methods were very costly and yielded time-delayed information regarding the components of the dried products. Therefore, we only could react towards deviations of setpoints and correct production conditions accordingly at a late point in time."

3. From delayed results to real-time control

NIR-Online systems were installed at the bottom of each spray drying unit to determine moisture and fat content as well as other parameters relevant for non-dairy products. Measurements are recorded on a millisecond time scale and are directly displayed in the control room. Whenever process deviations occur immediate corrective actions are taken by the operator. Water content of a powder may be corrected via flow rate and temperature of the drying gas or via the amount of injected milk or yeast concentrates. "We observe a stable production by complete real-time process control. NIR-Online sensors yield exact information in very short time and for less money than laboratory methods" emphasizes Klaus Selck.

Moreover, Schwarzwaldmilch is now capable of fully documenting their spray drying process for auditing and optimization purposes using NIR-Online software solutions.



Figure 4: Klaus Selck, Quality Control Manager at Schwarzwaldmilch, enjoying the comprehensive NIR-Online software with a manifold of documentation options.

4. Increasing profit with NIR-Online sensors

Schwarzwaldmilch already controls approximately 80 percent of their annual production with NIR-Online process analyzers. Measurements are more reliable, faster and less expensive in comparison to established laboratory methods.

NIR-Online sensors allow Schwarzwaldmilch to exactly reach targeted parameters such as moisture content of yeasts or fat and water mass percentage in dried dairy powders - even in highly regulated GMP / WHO environments. "We use NIR-Online sensors for gapless real-time process control: The closer we get to the maximum moisture content legally allowed in dried products - the more efficient is our production" summarizes Klaus Selck, Quality Control Manager at Schwarzwaldmilch.

5. About Schwarzwaldmilch Offenburg, Germany

After being called Milchgenossenschaft Freiburg ("Milk Cooperative Freiburg") founded in 1876 and renamed to Ortenauer Milchzentrale ("Milk Center Ortenau") in 1930, Schwarzwaldmilch ("Black Forrest Milk") was established as a brand in 1953. Today, they are a specialist in process technology. Schwarzwaldmilch does not only refine milk based on high-performance and energy-efficient production facilities, but also concentrates, emulsifies, dries, instantizes/agglomerates, mixes and repackages various premium liquid raw materials for pharmaceutical purposes. Schwarzwaldmilch operates in full compliance to IFS, kosher, halal, GMP and WHO regulations. Moreover, Schwarzwaldmilch receives milk from local, family-owned farmers with an average of 30 cows only supporting traditional dairy farming and is in accordance with environmental management based on DIN ISO 14001.

6 Contacts

For more detailed information please contact your local BUCHI representative or visit our website: www.buchi.com/NIR-Online