The Solarec Company is owned by the Belgian dairy cooperatives LDA (Laiterie Des Ardennes). The plant – located in South Belgium – is equipped to process 1 billion litres of milk per year. The modern facility combines focus of quality and efficiency to supply a complete range of dairy products – from milk powder to butter. The total production capacity of whole and skim milk powder at the two production lines is around 75,000 tonnes. Additionally, Solarec produces approximately 30,000 tonnes of butter per year at their modern butter production line.

Solarec has invested in two PerkinElmer DA 7300 In-line NIR systems for its skim milk powder and whole milk powder production lines. Since 2015 Solarec has been using a third PerkinElmer DA 7300 in-line NIR system for monitoring and control of the butter production line. In butter the moisture content is the most important parameter to control. The EU regulation allows a maximum moisture content of 16.0%. A lower content reduces weight and margin. For effective monitoring and control of moisture content, all predicted NIR values are shown in essentially real-time in the measuring station and are available to all production employees. In this manner, staff have continuous access to information about the current status of the butter quality and can react immediately to production or quality issues.

The investment has amortized in less than one year simply by reducing the range of moisture fluctuations in the butter. The use of the DA 7300 in-line system also leads to a more uniform product and helps reduce rejects – especially after production start-ups and re-starts. The DA 7300 also monitors butterfat and salt which also contributes to the profitability of the investment.

The instrument has been installed at the outlet of the butter churn (Figure 2) in order to continuously measure moisture, butterfat, salt content and colour (L*a*b). The results are used for quick adjustments of moisture content during butter production. Moreover, results are used for a complete documentation of the product quality.
For greater knowledge of the production process, real-time information is required. This data enables the capability of systematic adjustments in the production process – such as whey dosing in butter – to control the moisture content to 16.0%. The adjustments can be manual or automated.

The use of the DA 7300 in-line on the butter production line offers huge advantages for Solarec. Without process control, the moisture content in the final product varies between 15.5 - 16.0% due to variation in materials and processing. This leads to moisture content near 15.8% as an annual statistical average. Solarec increased the average moisture content to 15.9% by continuously applying NIR real-time monitoring for the optimization of whey dosage.

With an annual production of approximately 30,000 t of butter, this average increase in the moisture content of around 0.1% corresponds to an additional output of more than 30 t butter per year at the same fixed costs. This equals to a surplus profit of around 60,000 Euro per year, assuming that the average price for butter is 2,000 - Euro/t. In other words, the Solarec investment into the DA 7300 in-line process system has been amortized less than one year period just with the help of a better moisture control.

All relevant quality parameters can be monitored real-time when using the DA 7300 process system. If product parameters are out of specification, immediate action can be taken and corrections can be applied to the process. Incorrect batches where moisture, butterfat, and/or salt are out of spec can be detected instantly thereby preventing blending with material from quality production runs.

In total, Solarec realizes significant gains in profitability by using the DA 7300 in-line. They gain valuable process knowledge, higher production reliability, more stable and efficient production processes, and more homogenous butter production with consistently higher quality.