Monitoring the milling step in flour industry

The task of flour producers is to deliver and guarantee that customers receive flour according to their specific requirements.

Real-time quality control of flour during its production by continuously monitoring key parameters such as moisture, protein, and ash content as well as specks and impurities detection are of critical importance to ensure consistent product quality with optimum efficiency.

The installation of a BUCHI NIR-Online® process analyzer equipped with high resolution CCD camera after the milling step enables to monitor flour composition and quality in a fast, simple and reliable way.

1. Introduction

Quality control in the milling flour industry is increasingly important and is fuelled by the demands of customers requiring special flour for different applications.

Millers have to guarantee that customers receive flour according to their specific requirements.

Traditional control of the produced flour quality (protein, moisture, ash content, etc.) is generally limited to selected and time-delayed information which can have costly results. Moreover, this information is obtained by using conventional chemical methods, which are tedious, off-line, destructive, and time consuming.1-3

Real-time control of the milling step is needed to immediately react and remove the non-complying products, thus, anticipating customer reject and/or complaints and ensuring high final product quality and consistency.

Post milling implementation of a BUCHI NIR-Online® process analyzer equipped with high resolution CCD camera (Fig. 1) provides full characterization of flour quality. Within milli-seconds, several parameters (see Table 1) are continuously, simultaneously and accurately measured.

This application note reports the BUCHI NIR-Online® process analyzer performance to monitor flour composition.

2. Measurement setup

BUCHI NIR-Online® process analyzer: X-Four (VIS/NIR/CCD Camera)

Wavelength range: 400-1700 nm

Measurement principle: Reflection

3. Results

The BUCHI NIR-Online® process analyzer was found to be suitable for accurate measurements of the relevant parameters in flour (Table 1).

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range (%)</th>
<th>SEC</th>
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<tbody>
<tr>
<td>Protein</td>
<td>7.0-17.5</td>
<td>0.19</td>
</tr>
<tr>
<td>Moisture</td>
<td>10.0-16.5</td>
<td>0.20</td>
</tr>
<tr>
<td>Ash</td>
<td>0.27-0.7</td>
<td>0.02</td>
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<tr>
<td></td>
<td>0.70-2.2</td>
<td>0.03</td>
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</tbody>
</table>

SEC. Standard error of calibration (absolute)

Other parameters successfully monitored are fat, specks and gluten.

4. Conclusion

Obtained results clearly show that an NIR-Online® process analyzer equipped with a flange is able to simultaneously measure multiple properties of flour.

Online measurements provide real-time analysis of critical-to-quality attributes. This allows immediate operator interaction in case of out of specifications batches and leads to maximum process efficiency and product quality.

5. References