

Process and Quality Control in the Malt Industry

INTRODUCTION

Malt producers and the subsequent industries are processing hundreds of tons of grain and malt. The monitoring of all processes from incoming goods inspection through production right up to outgoing goods inspection is of vital importance for end-to-end quality management to ensure a constant, high quality standard of the products. Conventional laboratory analysis alone is no longer able to meet these requirements. The accurate assessment of the complex processes involved requires the additional use of on-line analysis – a field where easy-to-use technologies are needed. New analytical instruments are now available for the verification of a wide variety of constituents and parameters such as moisture, protein, soluble nitrogen, extract, viscosity and color, both in the laboratory and on-line during the production process.

METHOD AND FIELDS OF APPLICATION

The analytical instruments use fast, high-precision diode array spectrometers, covering the visual to NIR wavelength region. Measurement is performed in reflected light. Due to the extremely short response times of these spectrometers, the instruments can be used in the production process for monitoring belts carrying raw materials and liquid flow in pipes. This permits large quantities of raw material or products to be inspected. Compared with random lab tests, this offers the advantage that highly accurate information can for the first time be obtained on the material's homogeneity. When the spectrometers are used in-line during the production process, the measuring signals can be transmitted to the plant's process control system for customized production control.

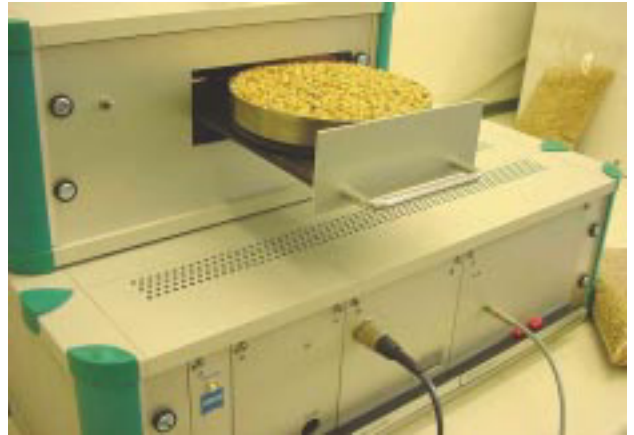


Figure 2: Incoming raw materials inspection



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SYSTEM AND SOFTWARE

The technology permits the use of both fiber-coupled (MCS 500) and fiberless systems (CORONA). The diode array spectrometer systems are based on the successful ZEISS MMS polychromator technology, with cascaded spectrometers. This allows simultaneous measurements in the visual and NIR wavelength regions.

Possible software available includes the successful CORA software. For special-purpose and dedicated applications, we recommend solutions under LabVIEW. DLLs for C++ and LabVIEW offer the possibility of programming customized software interfaces and of integrating our measuring systems into overall processes.



Figure 3: CORONA System

BENEFITS

- Fast, high-precision measurement, enhanced data accuracy
- Suitability for analysis during production – transfer of the data to a process control center
- Successful measuring systems and methods
- High reliability and low maintenance requirements, as the spectrometer contains no movable parts
- User-friendly software
- Detailed spectral information and measured data available in next to no time
- Flexible installation possibilities due to fiber-coupled technology



Figure 4: MCS 500 System

MEASUREMENT PARAMETERS

Product	Constituent	Correlation	Standard Error (SEC in %)	Product	Constituent	Correlation	Standard Error (SEC in %)
Wheat	Protein	0,98	0,22	Malt	Protein	0,97	0,21
	Moisture	0,99	0,22		Soluble N	0,96	17,8
			Extract		0,98	0,27	
			Water		0,98	0,22	
			EVG		0,96	0,38	
			Kolbach		0,95	1,3	
			Mealiness		0,97	3,1	
			Viscosity		0,97	0,09	
			Friab.-Value	0,97	3,1		
Barley	Protein	0,98	0,24	Triticale	Protein	0,97	0,22
	Moisture	0,99	0,2		Moisture	0,99	0,2

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