APPLICATION NOTE - NIR ANALYSIS of **MALT** *with ZEISS Corona extreme*

Target Industry:
Breweries
Malting Plants

INTRODUCTION:
NIR-Analysis can deliver results **very quickly and cost efficient** for organic parameters e.g **moisture, protein, extract in dry matter, FAN, viscosity** and many more.
Wet chemistry analysis is time and cost intensive when it comes to large numbers of samples.
The non-destructive NIR measurement takes **less than one minute** to complete and to determine multiple components at the same time. The outstanding performance and quality of the **Carl ZEISS Spectroscopy** analyzer and the application expertise of **Noack & Co GmbH**, guarantee our customers the most reliable results.

THE ANALYZER:
Few other spectrometer systems from **Carl ZEISS Spectroscopy** incorporate as much application-related experience as the new **Corona extreme**.
The spectrometer features fiber free, high energy illumination with outstanding optical properties and internal referencing.
The Spectra Range is 950-1650nm.

THE MEASUREMENT:
Laboratory mode is used to obtain a continuous quality control of the incoming material.
A petri-dish of the Zeiss **Turnstep** module is filled with sample material and then put onto the Corona Extreme.
The measurement takes few seconds and the results are stored in the internal software database. The results and spectra can be easily extracted for further use or analysis.

YOUR ADVANTAGES:

- **All parameters in less than 1 minute**
- **No sample preparation**
- **No grinding, no chemicals**
- **Re-usable petri-dishes**
- **User friendly software**
- **Very low cost of ownership**
- **Fully transferable from laboratory mode to online setup**

Figure 1: Laboratory configuration with Turnstep Module

ONLINE SETUP:

Figure2: On-Line configuration

The idea for creating the Corona extreme was for the measuring sensor to become a core component of the process.
It has been designed to run under extreme conditions.
You may calibrate your Zeiss Corona extreme sensor in the laboratory and then mount in **directly in-line at your process**.

Compensation procedures make it very easy to directly go from the laboratory into production.

CALIBRATION:

The reference values were provided throughout a scientific thesis by one of the **world's leading breweries** central laboratory by certified **reference methods.**

CALIBRATION PERFORMANCE:

The table shows the actual available parameters included in the calibration files. The minimum and maximum values indicate the prediction range for the parameters available.
SECV (Standard Error of Cross Validation) indicates the prediction performance.

		Calibration Range		
Parameter	**Unit**	**MIN**	**MAX**	**SECV**
Moisture	%	3,6	5,6	0,2
Protein	%	9,6	11,9	0,2
Extract DM	%	79,7	83,8	0,3
soluble Nitrogen	mg/100g	542	743	22
Friabilimeter	%	77,4	97,2	2
Viscosity	mPas	1,43	1,62	0,02
ß-Glucan	ppm	62	386	32
ß-Glucan	g/100g DM	0,056	0,346	0,03
FAN	mg/l	116	189	11
Kolbach value (ELG)	%	33,9	45,4	1,6
Color EBC		2,7	4,4	0,3
K-Color EBC		4,2	7,4	0,5
Total Nitrogen	% DM	1,53	1,89	0,3
EFS airdry	% airdry	75,4	80,1	0,3
DMS P	µg/l	142	581	54
DMS P	mg/kg DM	1,48	6,06	0,7

Figure 3: Calibration file details

SOFTWARE:

ZEISS InProcess Software is designed to meet the customers need in every possible application.
Its modular design is perfect for the creation of customized views and procedures.
You can smoothly change the setup from Laboratory Mode to Online Mode without great adjustments.
The graphic user interface is comprised of icon menus giving it a familiar feel of operation at first sight. In addition, users may configure sequences, calculations and display formats based on their individual requirements.

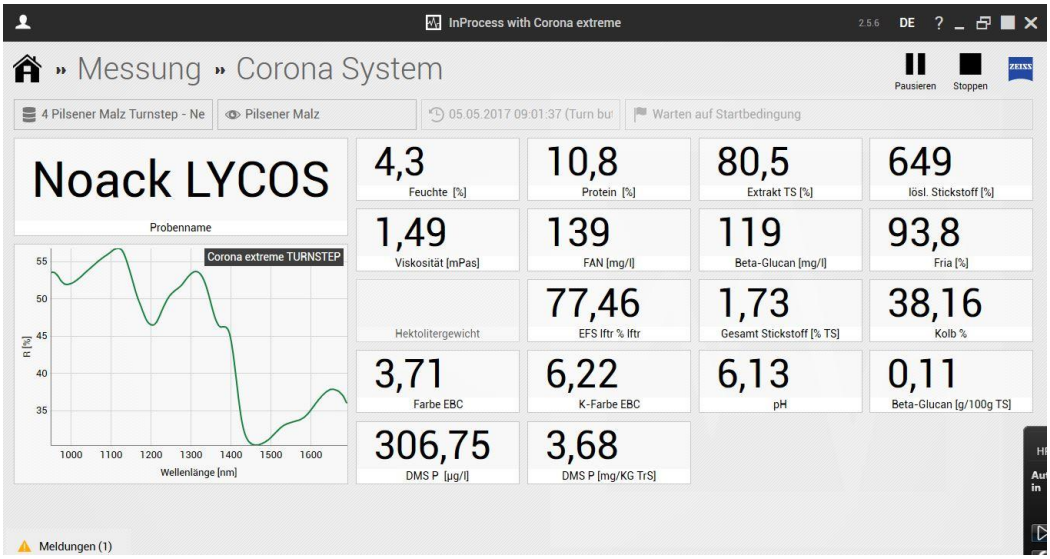

Figure 4: ZEISS InProcess Software shows results after measurement