Solutions from ZEISS

For the tobacco industry
One-stop shop
The key to the success of ZEISS spectrometer systems is that ZEISS develops and manufactures all key components internally. The ZEISS product portfolio ranges from electronics and diffractive gratings to spectrometer modules in addition to electronics and software. The spectrometer system also incorporates applications specific software and sample calibration for the identification of substances. ZEISS’ expertise in the these key components Core areas enables perfect matching of the single parts, components as well as the fast and uncomplicated modification to customer demands.

Pioneering from the start
Working with various partners in the agricultural sector, ZEISS was one of the first companies to develop spectrometers for use in the farming industry, on harvesting machines. Our spectrometer systems are used wherever precise and reliable measuring results are needed despite fluctuating temperatures, vibrations and shocks.
Since the beginning of these this collaborations, thousands of ZEISS spectrometers have been installed for use in agriculture.

Support also for your tailored solution
Our large team of sales and service staff available in our subsidiaries or well-structured global dealernetwork enables fast and expert support and assistance. Our internal applications specialists, calibration and design experts, and software developers provide in-process assistance for application inquiries and new challenges, as well as for the integration of ZEISS products.

Thanks to its years of experience in process spectroscopy, ZEISS has a considerable advantage over other spectrometer manufacturers, who usually come from the laboratory analysis sector.
Tobacco is a plant product, produced from the broad leaves of the genus Nicotiana (tobacco). The quality of tobacco mainly depends on the varieties used and the climatic conditions of the cultivation area, as well as the particular location in which the plant is growing.

Various types of tobacco (Orient, Virginia, Burley, ...) are used in cigarette manufacturing. These varieties come from different cultivation areas (China, Brazil, Zimbabwe and the USA). Therefore, the starting material is non-homogeneous. In order to guarantee consistently good quality, the harmful substances contained in the tobacco are reduced and its aroma is refined.

Through continuous monitoring, far more information may be gained from the process. If the measurement is carried out in real time and practically with the precision of an analysis lab, the process can be monitored and optimized in a targeted manner. The seamless documentation of the material streams (traceability) also increases product safety.

We offer our customers two solutions which carry out a fast, safe, exact and reproducible analysis of the substances contained in the tobacco. In these solutions, ease of use and integration into the manufacturing process are paramount.
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Lab
In today’s society, the enjoyment of tobacco is highly controversial and is subject to strict directives and inspections due to the reputation of being harmful to health. In order to comply with these requirements as well as possible, and to quickly recognize, or avoid, any deviations which may occur, a rapid analysis of the raw material is necessary. This begins as early as incoming goods inspection. Only when the quality of the starting material is known can the manufacturing process be adjusted accordingly. However, in cigarette manufacturing also, when it comes to small batches, it is highly advantageous to monitor the process close to production. Analyzing the formula in a matter of seconds enables an instant reaction. This minimizes waste during the production process. Solutions from ZEISS can be very helpful here.

Process
Cigarette manufacture is subject to strict controls. This is the only way to achieve a high degree of product safety and traceability. In addition to product homogeneity, the substances contained in the raw materials are vital for customer satisfaction. ZEISS products such as the ARMOR system undertake the seamless process monitoring and documentation of these parameters. Continuous, fast and precise analysis in-process in real time is particularly important here. This ensures that information on process stability is available at all times, and enables an instant reaction and re-stabilization of the process in the event of a deviation from the ingredient limits. Through continuous process monitoring, the process can also be optimized and thus time and raw materials can also be saved.

Tobacco Analysis in the Lab and In-process

Application in the lab or close to production, incoming goods inspection or random sampling in small batches

Products raw tobacco, fine cut, raw tobacco powder

Parameters humidity, nicotine, sugar, propylene, glycerin, benzoic acid, na benzoate

Result quality of the raw material

Application control and optimization of manufacturing process, inspection of formula

Products raw tobacco, fine cut, raw tobacco powder

Parameters humidity, nicotine, sugar, propylene, glycerin, benzoic acid, na benzoate

Result defined product quality and adherence to formula compliance with quality standards increased productivity traceability
ZEISS as a Solutions Provider. At-line Analysis of Tobacco – CORONA PLUS

Especially for use close to production, the CORONA PLUS compact system was developed for the analysis of tobacco and its processing stages. It allows all main quality parameters to be inspected during production through random sampling.

CORONA PLUS 45 NIR with TURNSTEP
The optical design allows for a compact unit (spectrometer, electronics and optics all in one). Thus, CORONA PLUS 45 NIR takes up only a small amount of space in the lab or close to production. In combination with TURNSTEP, it enables the measurement of large specimen quantities in a lab within a short time, thus leading to a reduction of sampling errors. This makes the measurement of the quality-specified ingredients of inhomogeneous raw materials significantly more exact and forms the prerequisite for the consistent quality determination of the sample material. For sample presentation, the TURNSTEP is perfectly suited for use with the CORONA PLUS 45 NIR, and the two may be connected very quickly and easily. The system is characterized by convenient operation (1-button) and short measuring times (15 s) with a high degree of measuring accuracy. This means that a labor-intensive sample preparation is not necessary, which saves time and increases sample throughput. Obviously, all measurement results can be saved and evaluated with 100% traceability.

- High specimen throughput through fast measurement sequence
- Significant reduction in measurement errors on inhomogeneous sample material
- Fully automated operation in conjunction with CORONA spectrometers and corresponding measuring software
- Measurement time 15 seconds
- Robust and compact construction
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ZEISS as a Solutions Provider.
Online Analysis of Tobacco – ARMOR Measuring System.

The ARMOR measuring system consists of the ARMOR reflection measuring head and proven MCS-600 spectrometer series from ZEISS. Using this system, analyze your products contact-free on lines and conveyor belts.

ARMOR Measuring system
ARMOR is a reflection measuring head designed for use on open systems such as conveyor belts, which can precisely analyze the content of tobacco and its processing stages. In the process, the inhomogeneity of sample distribution and tough environmental conditions (heat, dust and steam) are irrelevant.

The ARMOR reflection measuring head is combined with the NIR spectrometers of the MCS 600 type series, and thus forms a precise, reliable and mutually compatible unit. The measuring head and spectrometer are combined via optical fibers, which enables simple installation at any point of the production line.

- Measurements may be taken at large sampling distances (between 100 and 240 mm)
- Results independent of sample height
- May be used in hot and contaminated environments
- Stainless steel housing, robust and compact construction
- Splash water protected and dust-proof
- Automatic referencing and self-test via spectrometer software
- Simple bulb change without readjustment
- Usable wavelength range from 450 to 2150 nm
Calibration

All the main quality features of tobacco and the different processing stages can be analyzed using the solutions described. The calibrations have been created and optimized in collaboration with the Erdmann engineering firm.

**INB Erdmann**
The company was established in 1998. Since then, it has been dealing with application projects in process control in the NIR and UV/VIS area for the food, animal feed, chemical and plastics industries.
The main focus is on the development of robust calibrations for the application of spectrometers in the lab, as well as for process inspection, which allow for comprehensive product analysis.

<table>
<thead>
<tr>
<th>Product</th>
<th>Substance</th>
<th>Working range</th>
<th>Standard error (SEP in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>raw tobacco</td>
<td>humidity</td>
<td>0-35%</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>nicotine</td>
<td>0-6%</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>sugar</td>
<td>0-25%</td>
<td>0.20</td>
</tr>
<tr>
<td>fine cut</td>
<td>humidity</td>
<td>0-20%</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td>nicotine</td>
<td>0-6%</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>sugar</td>
<td>0-20%</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>propylene</td>
<td>0-3%</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>glycerin</td>
<td>0-3%</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>benzoic acid</td>
<td>400-2000 mg/kg</td>
<td>50mg/kg</td>
</tr>
<tr>
<td></td>
<td>na benzoate</td>
<td>400-2000 mg/kg</td>
<td>50mg/kg</td>
</tr>
<tr>
<td>raw tobacco powder</td>
<td>humidity</td>
<td>0-20%</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>nicotine</td>
<td>0-6%</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>sugar</td>
<td>0-20%</td>
<td>0.20</td>
</tr>
</tbody>
</table>
Support also for your tailored solution

Our large team of sales and service staff available in our subsidiaries or well-structured global dealer network enable fast and expert support and assistance.

Global ZEISS service permits flexible, on-site support via telephone or Internet.

What we offer:
- solutions tailored to your needs
- customized optimization and extension of your systems through personal consultation
- expert on-site support
- remote support via telephone, email and Internet
- promptness ensured through optimal deployment planning of our experienced employees
- customized maintenance and service agreements

Protect your investment and ask for the service agreement that best fits your needs. This ensures optimal performance and lengthens the service life of your ZEISS product. Thus, you can rest assured that your ZEISS product always guarantees reliable and precise results – day in, day out, year after year.