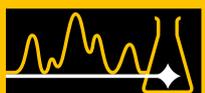




Process NIR Spectrometers

fast, precise, reliable

Product Brochure



Process Analytics: Universal and Efficient



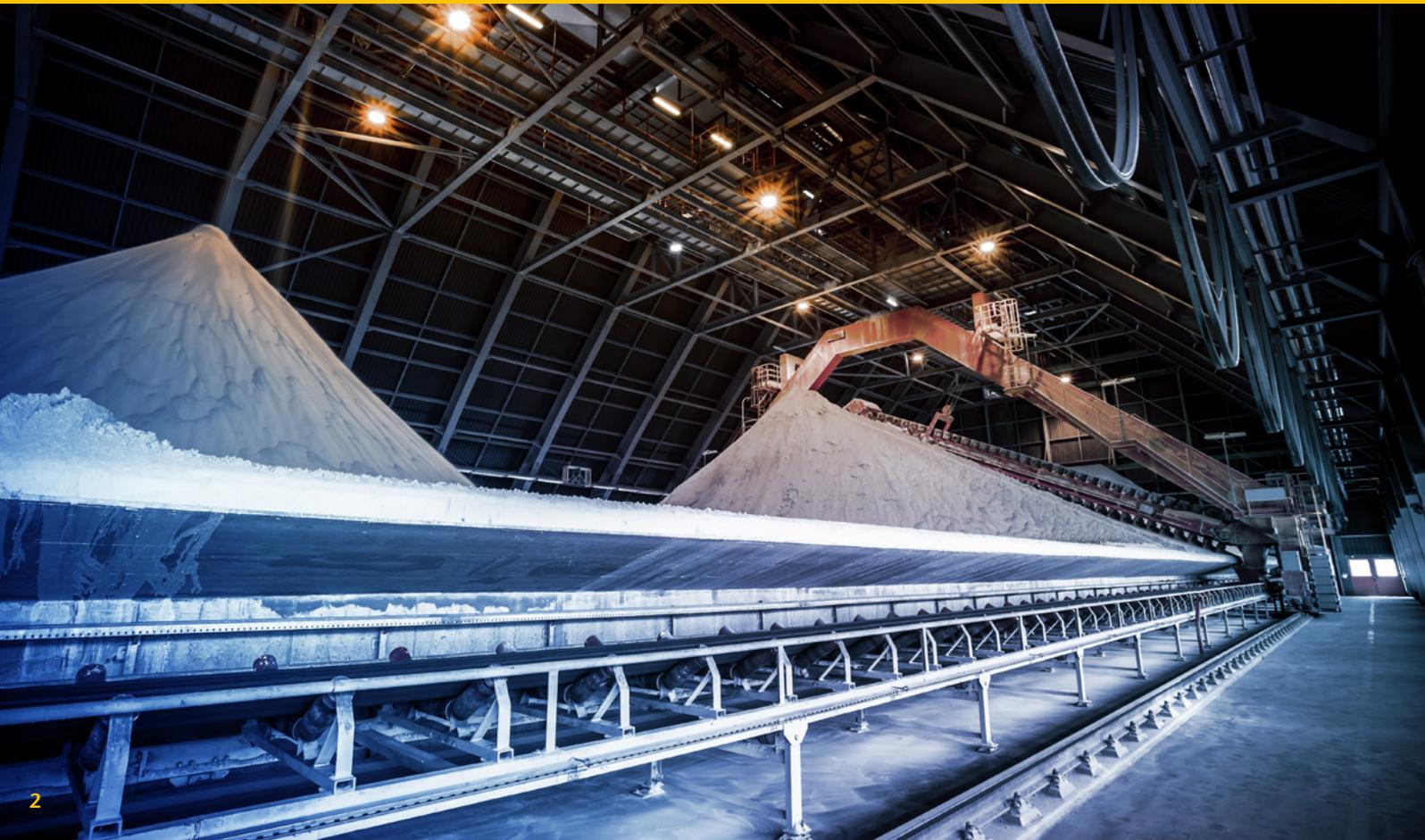
INCOMING GOODS →



PRODUCTION PROCESS →



PRODUCTS





Polytec Spectrometer Systems open up numerous possibilities for economic improvements in production environments: from incoming materials inspection to final product control.

The decisive advantage of process analytics is the automated real-time control of production processes. In addition to ensuring a consistent product quality, the production process itself can be monitored and optimized. Process analytics enables high-quality, cost-effective, and convenient solutions that provide a fast ROI. The method can be applied at several levels of the production chain: incoming goods inspection, process control and 100% end product classification. Many relevant parameters can be derived from a single measurement. For example, qualitative and quantitative chemical analysis or layer thickness measurements are typical applications.



Diode Array Spectroscopy

Optical spectroscopy is one of the most important and widely used methods in process analytics. Especially when based on diode array technology, it provides reliable results even at high measurement rates.

Advantages of optical process spectroscopy:

- Real-time process monitoring and control
- Non-destructive, non-invasive
- No sample preparation and wastage
- Increased efficiency and cost reduction e.g. by reducing rejects
- Suitable for statistical process management
- Proven technology



The System Concept: Modular for any Demand

As a manufacturer of high-quality optical measurement equipment, Polytec offers configurable spectrometer systems allowing optimized solutions for any individual application.



Modular Spectrometer Systems: Designed for Flexibility and Precision

Polytec NIR Spectrometer Systems (PSS) are designed to be flexibly configured to achieve the most advantageous solution for a wide variety of applications. Individual combinations of the most suitable probe, spectrometer and software fulfill the needs of different applications. Each component is standardized in order to ensure high precision and ease of use during process integration. The PSS systems are based on well-proven technology and offer application-specific solutions that are nevertheless safe and easy to integrate.



Benefits of the Modular System Concept:

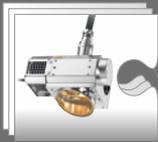
Standardized equipment and software providing

- High flexibility
- Easy integration
- Simplified operation

The Basis: High-Quality Components

Polytec Spectrometer Systems are manufactured using optical and electronic components specifically developed and manufactured in-house. We know our products down to the smallest screw. Everything is precisely coordinated to achieve high reliability with prompt and highly competent customer support.

Probes



Spectrometers



Sensitive Detection: The Probes

Appropriate sample presentation is the key to successful system operation. A variety of specialized probes are available to address different sample properties and installation situations.



Fast, Precise Measurements: The Spectrometers

Diode array technology combined with a superior transmission grating design enables the PSS spectrometers to be used for fast and reliable data acquisition. Several spectral ranges and power supply options are available.



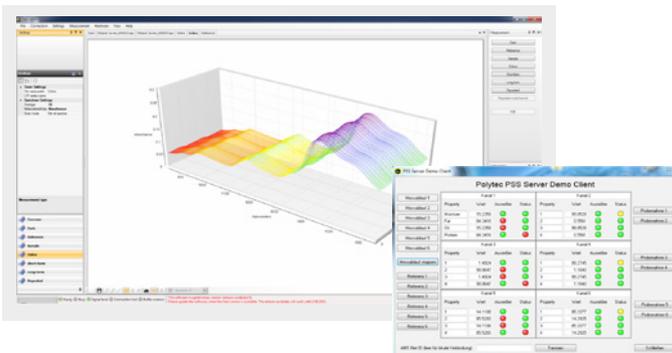


Software



Direct, Relevant Results: Software

Depending on the specific application, dedicated software solutions are available for laboratory data acquisition, multivariate data analysis, and process control.

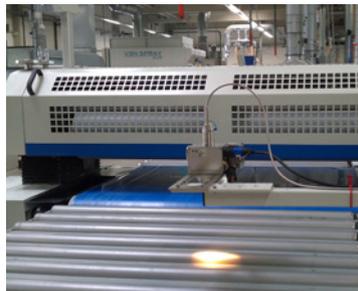




Probes



Adequate sample presentation is the key to successful system operation. To accommodate different sample properties and installation situations a variety of specialized probes are available.



Polytec Spectrometer Systems are used for efficient online control of

- Solids (e.g. bulk goods, powders, paper or textile webs)
- Fluids (e.g. liquids, suspensions, dispersions or paste-like media)
- Gases (e.g. aerosols or fumes)

Our probes are designed specifically for industrial applications and meet demanding requirements. They are resistant to dust, humidity, pressure and temperature.

Compliance with common production and safety regulations, e.g., for use in food industry or in explosion protection zones is another important feature.

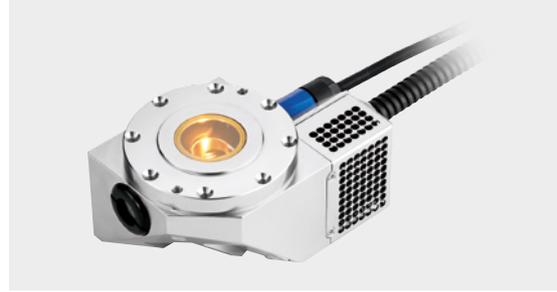


Non-Contact Probe PSS-H-A03

Reflection probe for measurements over large distances (conveyor belts, web applications, etc.)

Combined illumination and sensor unit for distances varying from 150 to 600 mm.

- Fully automated system calibration
- Adjustable measurement spot size
- Integrated 20 W tungsten-halogen light source for sample illumination
- SMA 905 optical fiber connection
- Industrial protection class IP64
- Stainless steel housing



Contact Probe PSS-H-B01

Reflection probe for measurements over short distances or in direct contact with the sample (tubes, chutes, funnels, etc.)

Combined illumination and sensor unit for distances varying from 0 to 50 mm.

- Fully automated system calibration
- Adjustable measurement spot size
- Integrated 20 W tungsten-halogen light source for sample illumination
- Optionally compliant with food laws or ATEX
- SMA 905 optical fiber connection
- Industrial protection class IP64
- Stainless steel housing with sapphire window



Immersible Probes

For measurements in liquids and other fluid samples, Polytec's reflection immersible probe PSS-H-CR1 is the right choice. Optionally, the probes are available compliant with food laws or ATEX.

- Robust stainless steel design with sapphire window
- Reflection probes with integrated white reference
- Special „9 around 1“ fiber configuration for superior S/N
- Optionally compliant to food laws or ATEX
- Variable flanges for convenient installation



Adjustable Probes

Easily adjustable probes for transmission measurements (e.g., gases), emission (e.g., hot samples like steel or glass), and reflectance (e.g., granules).

- Adjustable spot diameter and distance (i.e. variable d/D ratio)
- Achromatic optics with AR coating
- Suited for high environmental temperatures (<280 °C)
- SMA 905 optical fiber connection
- Optional as illumination head with integrated light source
- Optional gas tight



Spectrometers



Precision spectrometers designed to cover your required spectral ranges: Reliable in-process and laboratory measurements



PSS spectrometers offer an optimal solution for NIR process analytics. Based on diode array technology combined with superior transmission grating design, PSS spectrometers are used for fast and reliable data acquisition. The use of fiber coupled probes enables flexible integration in various measurement scenarios.

Features:

- Standardized spectral ranges
- Innovative transmission grating design
- High measurement rate
- Superior sensitivity and long term stability
- Uniform optical resolution at the theoretical limit
- Extremely low scattered light levels
- SMA 905 fiber connectors
- Ethernet interface

Model	Range	Detector	Pixels	Resolution
PSS 1720	850 – 1650 nm	InGaAs	256	<6.4 nm or <9.5 nm
PSS 1750	850 – 1650 nm	InGaAs	512	<3.2 nm or <4.8 nm
PSS 2120	1100 – 2100 nm	InGaAs	256	<7.9 nm or <11.9 nm
PSS 2220	1200 – 2200 nm	InGaAs	256	<7.9 nm or <11.9 nm

Housing and Power Supply

PSS Spectrometers are available with standard 19" plug-in housing with 110 – 240 VAC power supply for industrial cabinets. The small ½ 19" housing with integrated 10 – 30 VDC actively stabilized power supply is ideal for mobile applications.

PSS-M Polychromators

The core component of our NIR spectrometer systems is the PSS-M Polychromator, developed and manufactured in-house. It is a perfect match for many OEM requirements and comes with outstanding engineering support.

Features:

- Transmission design setup for maximum sensitivity and extremely low scattered light (contrast ratio > 1:50,000)
- Integrated shutter for dark signal measurement
- Uniform optical resolution at the theoretical limit
- Pre-aligned and supplied with wavelength calibration data ($\Delta \lambda < 0.5 \text{ nm}$)
- Prepared for use with various sensor electronics

Benefits:

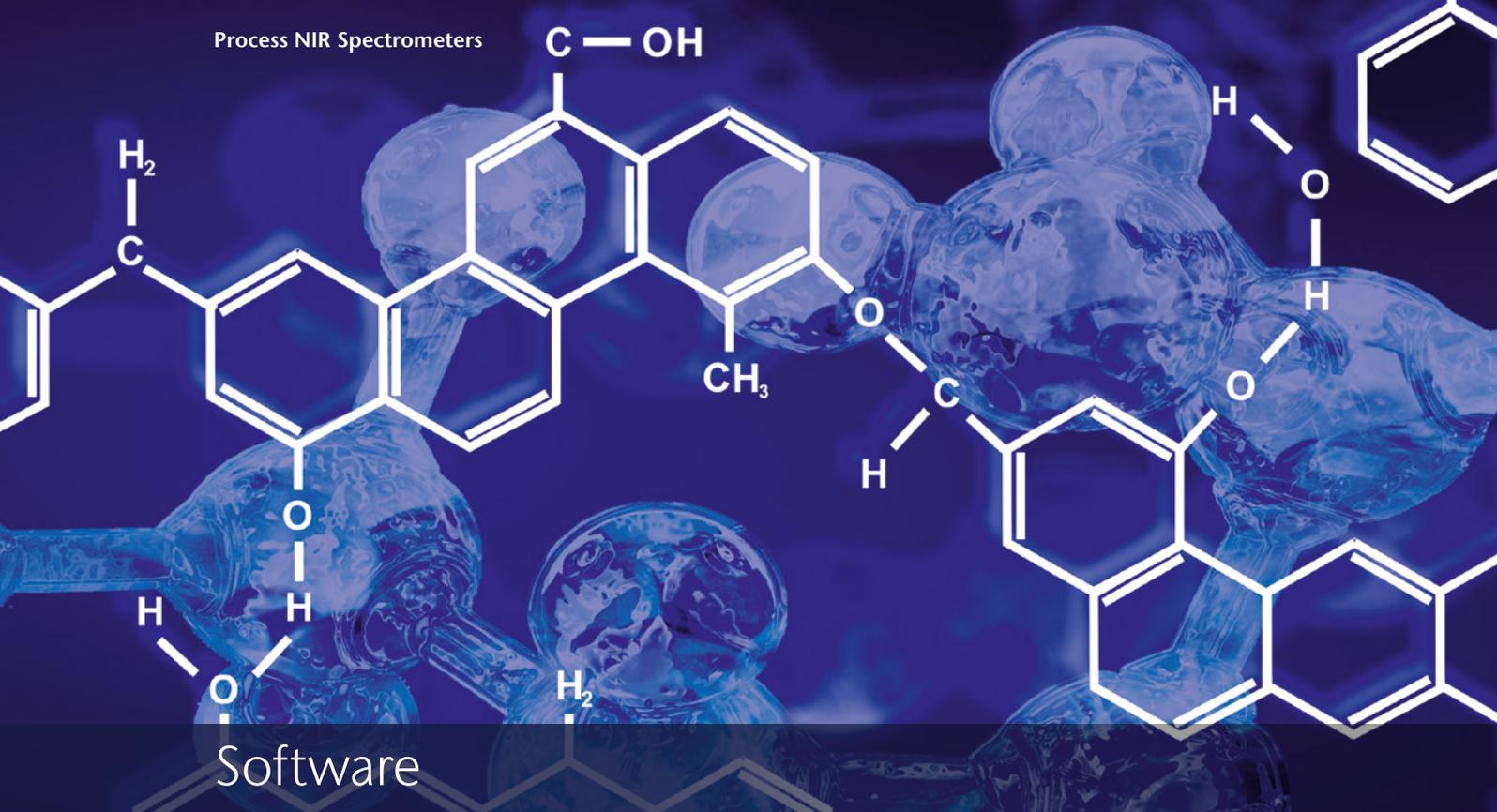
- Superior sensitivity for short integration times and high spectra rates
- Tightly specified wavelength ranges
- Ideal for calibration transfer
- SMA connection for standard fibers
- Convenient electrical and mechanical integration



Customized Solutions

Polytec provides customized OEM solutions for system suppliers with special needs regarding quality or price. These solutions are widely used in process, laboratory, or handheld applications.

- Consulting and feasibility studies for technical and commercial evaluation
- Optical design (spectral range, optical resolution, sensitivity etc.)
- Mechanical and electronic integration development
- Serial production

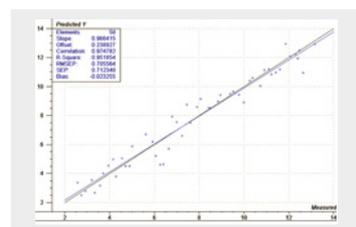
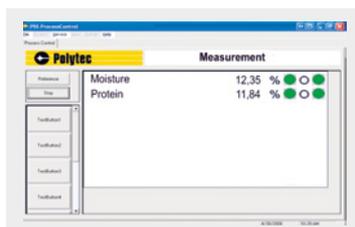


Software

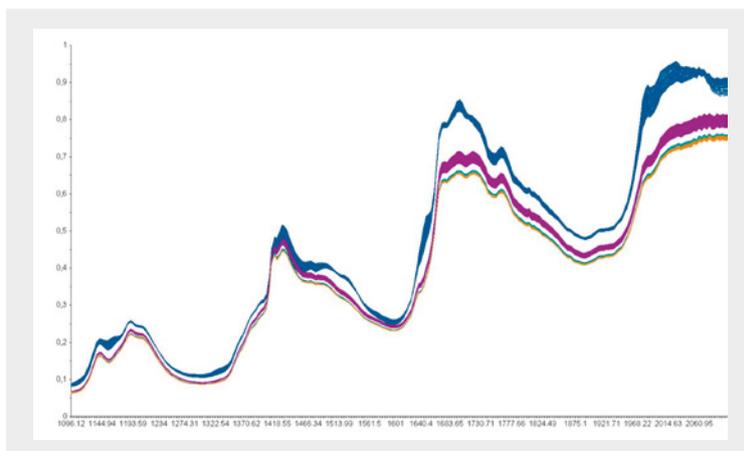


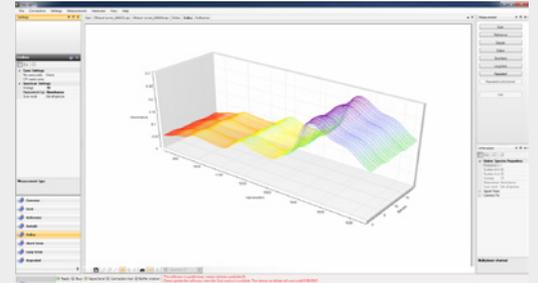
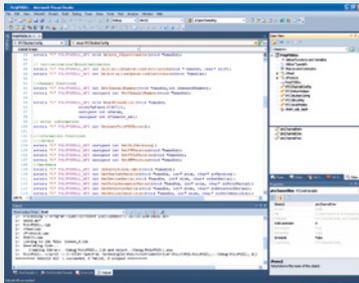
Depending on your needs, we have dedicated software solutions for laboratory data acquisition, multivariate data analysis and process control.

Laboratory and industrial applications differ depending on the typical measurement and output tasks required. For data acquisition in the laboratory, our software packages offer extensive measurement for fast and efficient data acquisition.



For online industrial applications we offer configurable solutions covering the specific measurement setup all the way up to communication with the process control system. Our software portfolio is completed by a range of compatible packages from well established multivariate data analysis providers.





PSS-S-DRV

PSS-S-DRV provides several possibilities for hardware driver implementation into your own software.

Implementation levels:

- ++ driver dll for basic instrument access
- COM object provides preconfigured properties for fast and easy implementation
- ActiveX control for high level instrument access incl. graphical user interface

PAS SERVER

The PAS SERVER software package is used for routine online analysis in process environments.

Features:

- Fully automated system operation
- Various user interfaces (clients or via PLC)
- Sophisticated data pretreatment
- Online chemometric predictions
- Warning and alarm thresholds
- Supports numerous analog and digital PLC interfaces

PAS SERVER supports direct use of standard chemometric prediction DLLs.

PAS LABS

Laboratory software PAS LABS is suitable for spectroscopic purposes. It offers automated system operations and easy data acquisition.

Features:

- Enhanced system operation with preconfigured measurement routines
- Easy data storage for subsequent chemometric method development
- Determination of thin film layer thickness

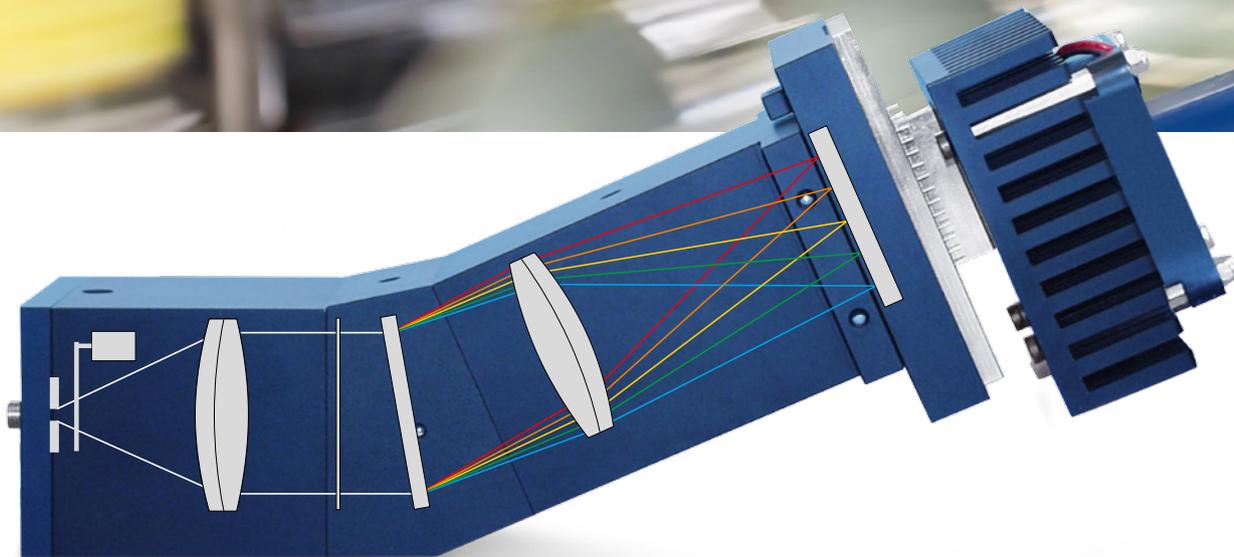
Multivariate Data Analysis for Laboratory and Process Spectroscopy

Polytec spectrometer systems are fully compatible with standard chemometric software packages for convenient multivariate data analysis of spectroscopic measurements. These packages can be successfully used for chemometric method development as well as for online predictions in process analytics.

Currently, we are offering various chemometric software from the following partners:

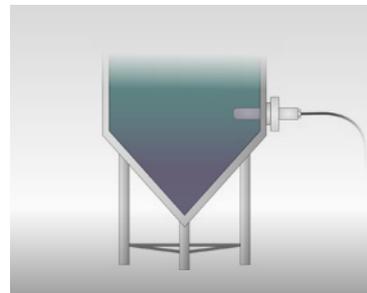
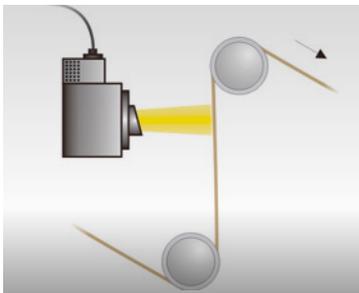
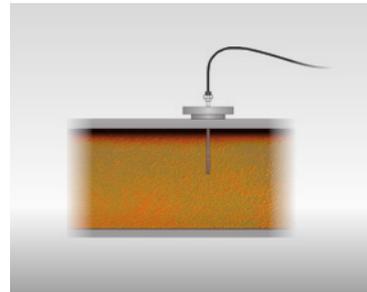
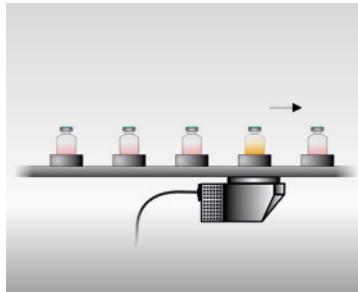
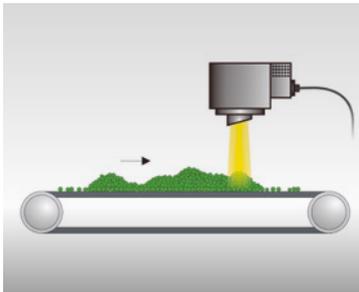
- Camo (The Unscrambler® X)
- SensoLogic (Calibration Wizard)
- Umetrics (Simca)





Diode Array Spectroscopy: Versatile and Robust

The core component of our NIR Spectrometer System is the PSS Polychromator. This assembly combines advanced diode array and 3D transmission grating technologies, resulting in high optical quality and a robust design.



Non-Contact Probes

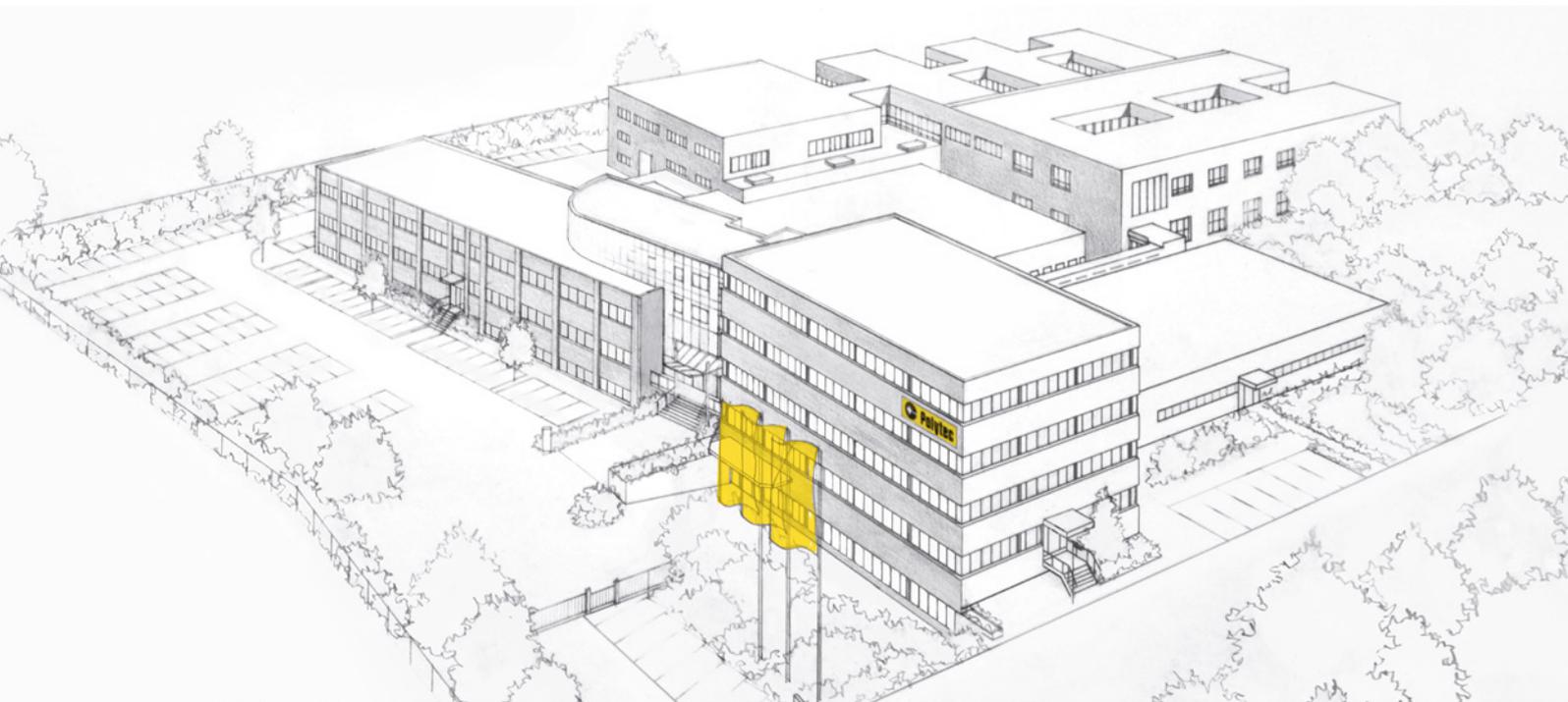
Non-contact online control of paper and textile webs or solid materials such as bulk goods on conveyor belts or chutes.

Contact Probes

Contact online measurements of powders and various fluid materials such as liquids, dispersions and paste-like media.

Immersible Probes

Direct online analytics of liquids in e.g. bio-reactors, pipelines or vessels.



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