LLA instruments

SCAN • SORT • SUSTAIN

Food Processing

NIR analysis for quality control, sorting, and online monitoring

Detection of foreign material

Identification of food additives

Moisture content

Fat, protein, and sugar content

LLA instruments
SCAN • SORT • SUSTAIN

NIR-SWIR spectroscopy for food and feed applications

Strict guidelines and regulations in food industries result in a high demand for analytical control of raw materials and products. The analytical control is commonly provided by expensive and time-consuming laboratory-based methods.

NIR-SWIR imaging is a fast and cost-efficient alternative for many applications. SWIR Identification is not based on colouring or density differences but on differences in material composition at a molecular level. SWIR Inspection of a material stream on a conveyor belt or a chute system by contact free detection can be utilised for unprocessed or processed solid food.

The SWIR and NIR hyperspectral imaging cameras **KUSTA 1.7** and **KUSTA 0.9** are suitable for online inspection in a food processing plant.

The spectrometer components can be easily integrated in existing industrial plants.

Fresh produce such as fruit, vegetables, meat and fish, or convenience and bakery products can be inspected and analysed. Both the detection of foreign materials and the identification of sub-standard goods by semi-quantitative analysis of nutrients are available.

Online inspection of unprocessed goods

Unprocessed food often contains foreign materials such as stems, leaves, nut shells, stones, insects or plastic packaging material. Contrary to commonly used RGB cameras, identical colouring and shape of produce and foreign material does not affect their successful identification by SWIR.

The VIS/NIR and SWIR hyperspectral imaging cameras, **KUSTA 0.9** and **KUSTA 1.7**, are ideally suitable for such demanding sorting tasks.

Figures 1 to 3 show ready-to-use application examples for the online monitoring of pole beans with or without stems, for an online separation of residual nut shells from walnuts, and for the identification of stone/clay in a potato material stream.

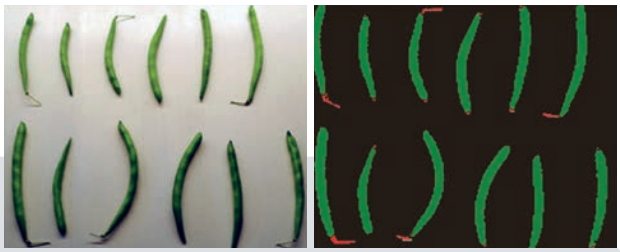

Figure 1: Camera picture and NIR identification of **green beans** and **stems**

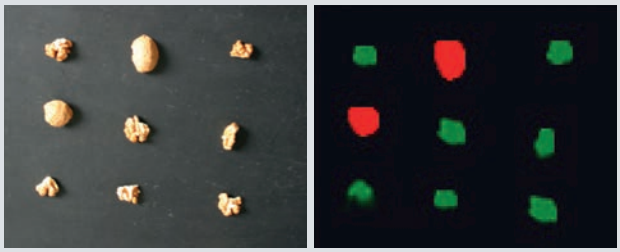

Figure 2: Camera picture and NIR identification of **walnuts** and **nutshell**

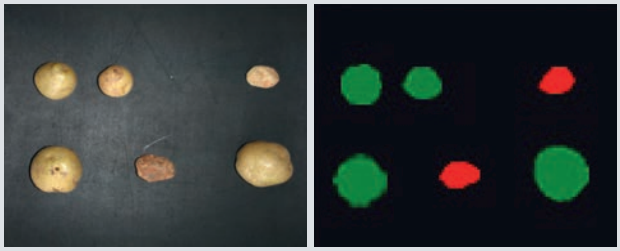

Figure 3: Camera picture and NIR identification of **potatoes** and **clay**

Online analysis of nutrients

Fatty Acids, Carbohydrates and Proteins

Modern processed food must meet strict product specific standards. To ensure the quality of the final product, visual inspection, gustation tests, as well as a laboratory nutrient analysis of control samples, are utilised.

The SWIR hyperspectral imaging camera **KUSTA 1.7** can be utilised for analysis of nutrient and water content directly in the production process. The analysis results are given in real time within fractions of seconds. Errors in the production process are detected at an early stage - leading to a minimised portion of reject.

Figures 4 to 6 show applications including semi-quantitative analysis of nutrients such as:

- Determination of fat, connective tissue and lean meat for production of minced meat
- Analysis of fat content in bakery products
- Identification of carbohydrates (sugars) and artificial sweeteners for candy production.

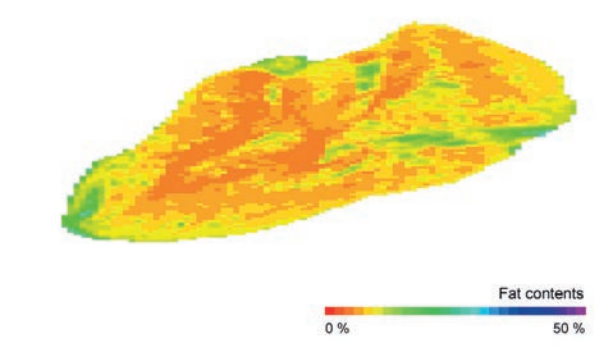

Figure 4: Determination of fat in meat

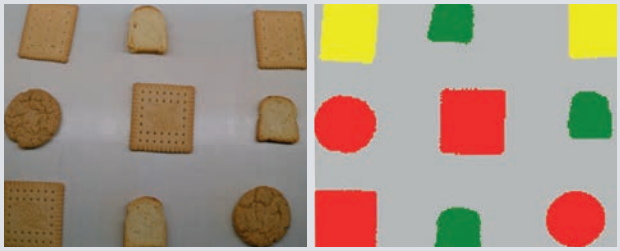

Figure 5: Camera picture and NIR identification of cookies
low-fat <9%, **medium-fat 9-19%**, **high-fat >19%**
Accuracy: +/- 0.5%

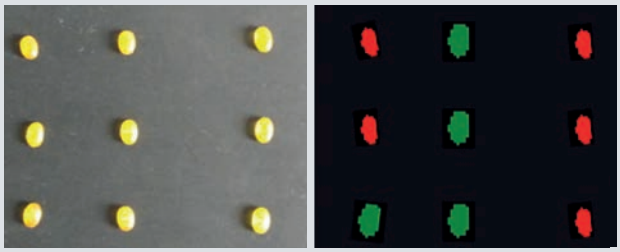

Figure 6: Camera picture and NIR identification result of **candy - artificial sweetener** and **candy - sucrose**

Technical specification

SWIR Hyperspectral Camera:	KUSTA 1.7	KUSTA 0.9
Spectral range	0.95 µm - 1.7 µm	0.35 µm - 0.95 µm (Δλ = 400 nm)
Material size	3 mm - 30 mm	1 mm - 30 mm
No. of tracks (spatial pixels)	318	Max. 1920, 384 @ 579 Hz
Spectral resolution	< 8 nm	< 5 nm
Scan rate	320 Hz (up to 3 kHz in ROI)	Max. 579 Hz
Illumination source	Illumination PMAmsi	
Sorting width	Up to 2.8m	
Optionals	LineScan-RGB camera, automatic calibration, mounting bridge, mirror unit	
Conveying speed	Up to 3 m/s	

LLA instruments

scan

with hyperspectral and x-ray fluorescence technology for precise material analysis

sort

with optical sensor-based systems for fast, high-throughput processing

sustain

with flexible software programmes to adapt to new material demands

Contact us to find the optimal solution for your application:

LLA Instruments GmbH
Justus-von-Liebig-Straße 9/11
12489 Berlin, Germany

T: +49 30 629 0790-0

E: mail@lla.de

www.lla-instruments.de

Part of Tibidabo Scientific Industries

LLA / FOOD / BR-rev02 / Mar2025