VISUM
SOLUTIONS

Process&Quality Control Systems

IRIS TECHNOLOGY SOLUTIONS

IRIS TECHNOLOGY SOLUTIONS

Quality and **Process Control Solutions** for **Industry**

Under the **Visum™** brand we manufacture **industrial solutions** with **NIR technology**, **Raman spectroscopy**, **Artificial Vision** and other combined **photonic techniques**.
We develop turnkey projects for **quality** and **process control** in **real time** for the **industry**.

In-line Spectroscopy

We combine **NIR** and **Raman spectroscopy**, among other **photonic techniques** such as **fluorescence** or **hyperspectral technology** together with **machine learning tools** and **software** for the **development** of **analytical solutions** and physical–chemical control in **production lines**.

Artificial Vision

We use our **knowledge in optics**, **software** and **engineering** to develop **artificial vision systems** and **neural networks** -or deep learning- to **distinguish** and **classify anomalies**, **characters** and **natural variations** in **complex patterns**.

Benefits

→ Real-time monitoring of physical and chemical parameters.

→ Industrial use and does not require specialized personnel.

→ Possibility of analyzing multiple parameters simultaneously.

→ Saves time in laboratory analysis, inputs or visual inspection.

→ Real time information to rectify processes and optimize decision making.

→ Detection of superficial foreign bodies.

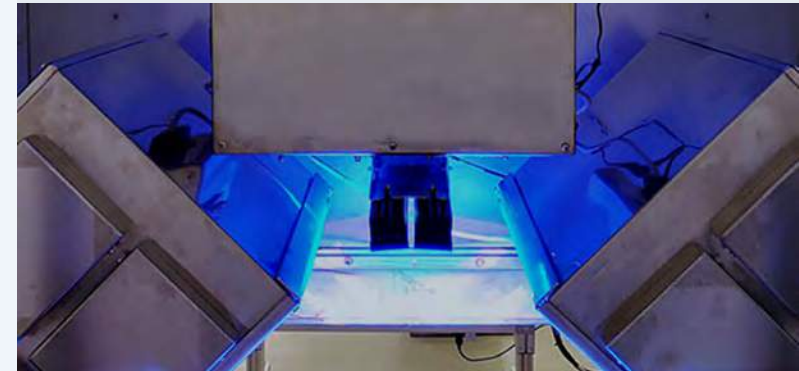→ Reduction of losses, claims and/or returns.

Sectors

Food

→ Bakery, Pastries and Oils

→ Fruits, Vegetables and Derivatives

→ Dairy Products

→ Fish and Seafood

→ Meat

Pharma

→ Medicines

→ Chemistry

→ Cosmetics

Other Industries

→ Wood

→ Plastics

→ Recycling

→ Others

Visum™
NIR In-Line

Integrated in-line NIR analyzer for continuous monitoring of product composition. Adaptable to different types of installations and production stages (conveyor, pipeline, tanks) or machinery (e.g. blenders).

Sectors

FOOD

→ Monitoring of quality parameters of juices, smoothies, purees, dairy products, oils, sweets, olives, nuts, mixtures, food supplements, among other foods.

→ Analysis of raw material on conveyor belts.

→ Determination of the homogeneity of mixtures in real time.

PHARMACEUTICAL and COSMETICS

→ Determination of uniformity and homogeneity of content (% APIs and excipients).

→ Determination of blending and drying end point.

OTHER INDUSTRIES

→ Identification of polymers and composites.

→ Classification of plastics.

→ Determination of water content.

Main Functionalities

→ Continuous monitoring of critical product quality attributes: solids, semisolids and liquids.

→ Integration and communication with process machinery and information systems.

→ End point determination of unit processes.

Visum™
Raman In-Line

The Visum In-Line Raman analyzer classifies and quantifies the most complex matrices and environments with high precision and in real time. It is designed to monitor parameters with minimum concentrations. Like the Visum NIR In-Line, it adapts to different configurations (tank, pipe, belt) or to process machinery through a probe (e.g. Bioreactor, Chambers, among others).

Raman spectroscopy - unlike NIR spectroscopy - is particularly suitable for aqueous and relatively homogeneous media as well as for the characterization of mixtures involving inorganic compounds. It is therefore a complementary tool to NIR spectroscopy.

Sectors

PHARMACEUTICAL and COSMETICS

→ Quantification of APIs and excipients.

→ Quantitative analysis of formulations

→ Process monitoring and characterization in bioreactors

→ Contamination detection

→ Crystallization process monitoring

→ Core and coated tablet content prediction.

OTHER INDUSTRIES

→ Polymerization process control.

Main Functionalities

→ Continuous monitoring of critical quality attributes in real time.

→ Quantification and classification of chemical elements at low concentrations and high analytical precision.

→ Characterization of complex molecular structures.

Visum™
HSI

The Visum HSI analyzer is an integrated system of hyperspectral NIR technology that combines optics, photonics and software to monitor in real time the physical-chemical parameters of the entire production, unit by unit, as the product passes distributed on a conveyor belt.
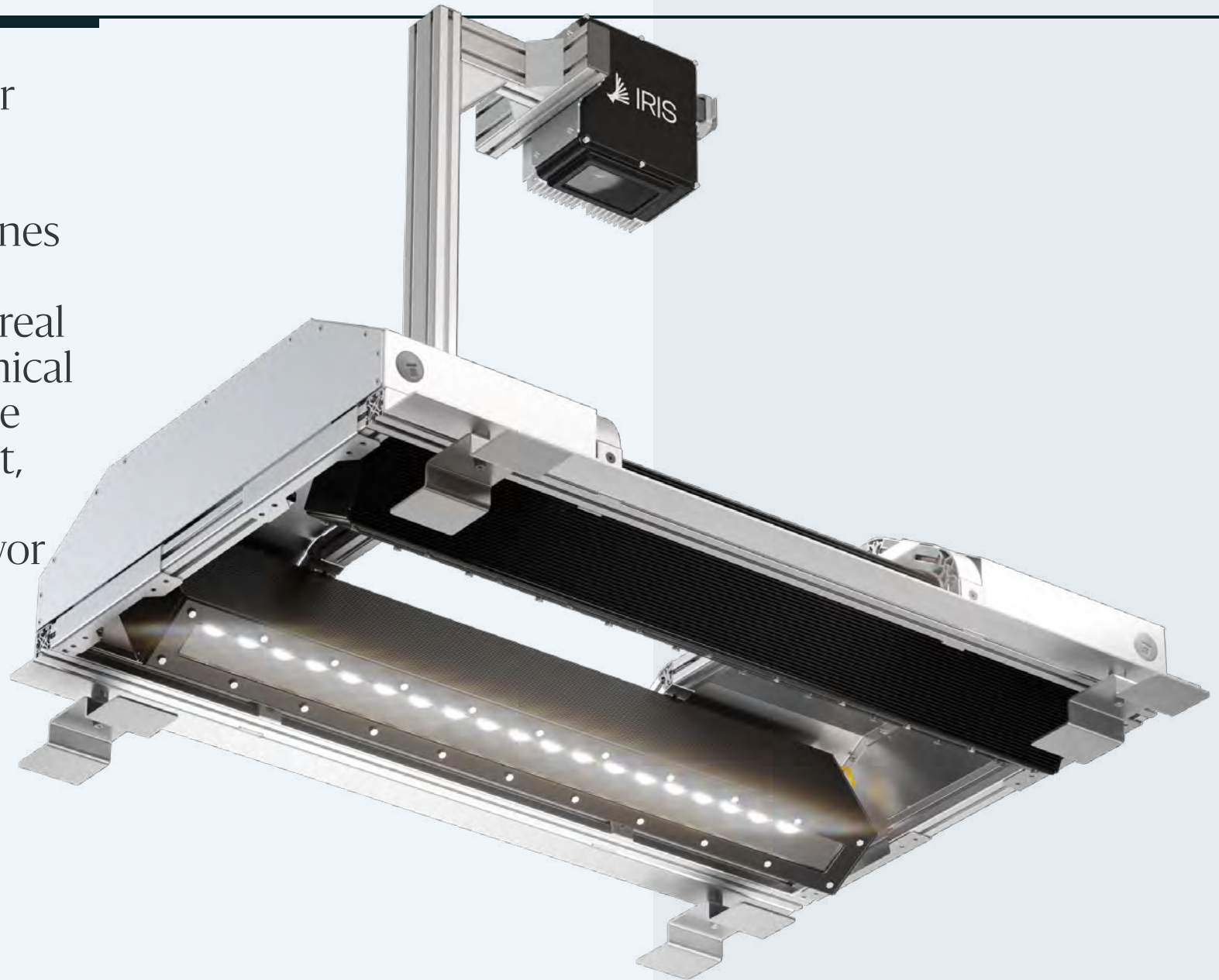
It is fast and efficient for determining spatially distributed chemical parameters, physical or visible defects, chemical defects and detecting anomalies or foreign (surface) bodies.

Main Functionalities

→ Continuous monitoring of all product units.

→ Fast and efficient detection of foreign bodies on the surface (everything that is not product, organic or inorganic: stones, metals, plastics, etc.).

→ Spatial distribution and homogeneity of the physical-chemical composition.

→ Operates in the visible, infrared and combined range.

→ Communication with management and rejection systems.

Sectors

FOOD

→ Control of quality attributes of each product (fats, proteins, acidity, ºBx, moisture and more).

→ Detection of foreign bodies and rejection.

→ Product homogenization.

→ Complete chemical analysis of fruits, vegetables, fish, seafood. Quantification and classification.

PLASTIC

→ Characterization, quantification and classification of polymers.

→ Sorting of plastics in recycling.

→ Recovery of multilayer plastics.

WOOD

→ In-line moisture monitoring of melamine boards.

→ Curing factor classification of melamine boards.

→ Quantification of wood chips flow for process control.

→ Detection of anomalies, defects and foreign bodies.

Visum™ **PALM**

Portable NIR analyzer to perform multiple analyses simultaneously in the field, in the warehouse or at the line. Visum Palm is a comfortable, easy to use, tactile device, adaptable to the needs of each product.

Sectors

FOOD

→ Control of quality parameters in fruits, vegetables, minced meat, pastries and bakery products, oils, powders, flours and other food products.

→ Verification of raw materials.

→ Typical particle size

PHARMACEUTICAL and COSMETICS

→ Identification of APIs and excipients.

→ Particle size determination.

→ At-line control of formulation content uniformity.

→ Control of the coating process of microgranulated forms.

→ At-line determination of the end point of unit processes.

→ Raw material identification and anomaly detection.

OTHER INDUSTRIES

→ Polymer identification.

→ Classification of plastics.

Main Functionalities

→ Analysis of incoming raw material at the factory or in the field.

→ Determination of critical quality attributes of different products at the line and in real time.

→ Multiparametric analyzer equipment, portable and does not require specialized personnel for its use.

ACCESORIOS

Visum™ DeepSight

Artificial vision system assisted by deep learning for colorimetric and morphological quality control and detection of defects or superficial foreign bodies.

Deep learning technology allows to obtain results where vision alone is not

Main Functionalities

→ Detection of surface quality defects for sorting or rejection.

→ Detection of surface foreign bodies.

→ Fast and economical line integration and communication with information systems.

→ Includes anti-reflex system, Visum software, computer system and touch screen.

Visum™
HPRS-1

Portable NIR HyperSpectral Imaging (HSI) Analyser designed to work in industrial and aggressive environments where product information about chemical composition and spatial information is required at different locations in the factory.

Main Functionalities

→ Easy and fast installation in production lines. Fast connectivity.

→ Continuous analysis of fat, protein and moisture content in minced meat and trimmings.

→ Detection of foreign bodies (plastics, cardboard, wood, metals, etc.) on surfaces.

→ Adulteration detection.

→ Anomaly Detection: Early warning in the event of unexpected changes in the product's composition that cannot be detected by dedicated chemical analysis

Our Service

Turnkey **Solutions**

→ Analysis of the customer's quality control needs and co-definition of specifications and scope.

→ Development of custom chemometric predictive models for greater accuracy and robustness, compared to generic libraries.

→ Integration service (including compatibility with existing plant data management systems).

→ Maintenance and after-sales service during the entire life cycle of the device.

→ Exploratory tests in our facilities.

→ Maximum flexibility for adapting the device to meet specific requirements.

→ On-site validation and training

Testimonials

The use of the VISUM Palm represents a huge revolution in terms of keeping the quality of the processes under control. It brings us real-time and reliable information and cost-saving data about total acidity and the content of the polar components in the frying oil of the production line. VISUM Palm also gives us useful data to determine the quality of fried products, like moisture and fat percentages. This functionality helps to save on arduous lab tasks and allows our employees to focus on other high value-added duties. The return on investment is clear and well founded.

Marina Diana
Scientific Research Manager
EUROPASTRY, S.A.

Thanks to the good work done between the teams of IRIS Technology and GESCASER, we have been able to get a great benefit from the end-to-end solutions development they have done for us with CTC+, a software capable of providing very detailed information of the stored grain quality as well as adding a prediction system, based on artificial intelligence tools, which learns from previous experiences in the silo, improving the efficiency of the ventilation system. For GESCASER, this software has been a qualitative leap that our customers have been grateful for.

Amadeu Casañé
Chief Executive Officer
GESCASER

At Almirall, we are committed to quality, innovation and the continuous improvement to make our processes more effective and efficient. For this reason, last year we incorporated into our quality control laboratory the new VISUM Palm analyzer, intended, in our case, for the online determination of different quality parameters in multiple products.

Thanks to the excellent communication between IRIS Technology Solutions and Almirall, the process of developing the Machine Learning models and qualifying the device for our technical requirements has been fluid and agile. At Almirall, we know that this is only the first step on a prosperous path together with IRIS towards the implementation of other PAT solutions, framed in our commitment to the Industry 4.0 paradigm.

José Martínez
Industrial Pharmaceutical Development Manager
Almirall

The development proposal we jointly presented was highly challenging. Despite the unforeseen and technical/scientific difficulties, a higher than expected target was achieved and today BIMBO Iberia has Visum equipment that we use to achieve our mission "to make delicious and nutritious food".

Juan A. Mena Gil
I+D
Bimbo Iberia

All and all, VISUM Palm is a solid piece of equipment that is portable, user-friendly and has a lot of potential. We and Prof Elliott's team are working in the area of food authenticity and vegetable oil speciation for a number of years now and looking for opportunities to make the analysis fast, portable and cost-effective. With the right application the VisumPalm ticks all the boxes.

Dr. Tassos Koidis' team
Research Leader and Lecturer in
Food Science and Nutrition
Queen's University Belfast

Under the framework of the EU funded H2020 project, Agrimax, in Nofima we have been testing the feasibility of selected rapid and non-destructive sensors for monitoring and controlling different extraction processes. Testing the dry matter content in cutin paste monitoring, an expensive and high-resolution lab instrument from a leading brand has been compared with the hand-held VISUM Palm, yielding strikingly similar results.

While both systems were capable of performing the analysis with the same level of accuracy, the VISUM PALM offers the added advantage of measuring on a quite small spot, thereby enabling high-quality spectra to also be obtained from hard and bulk samples.

Dr. Jens Petter Wold
Senior Scientist
NOFIMA
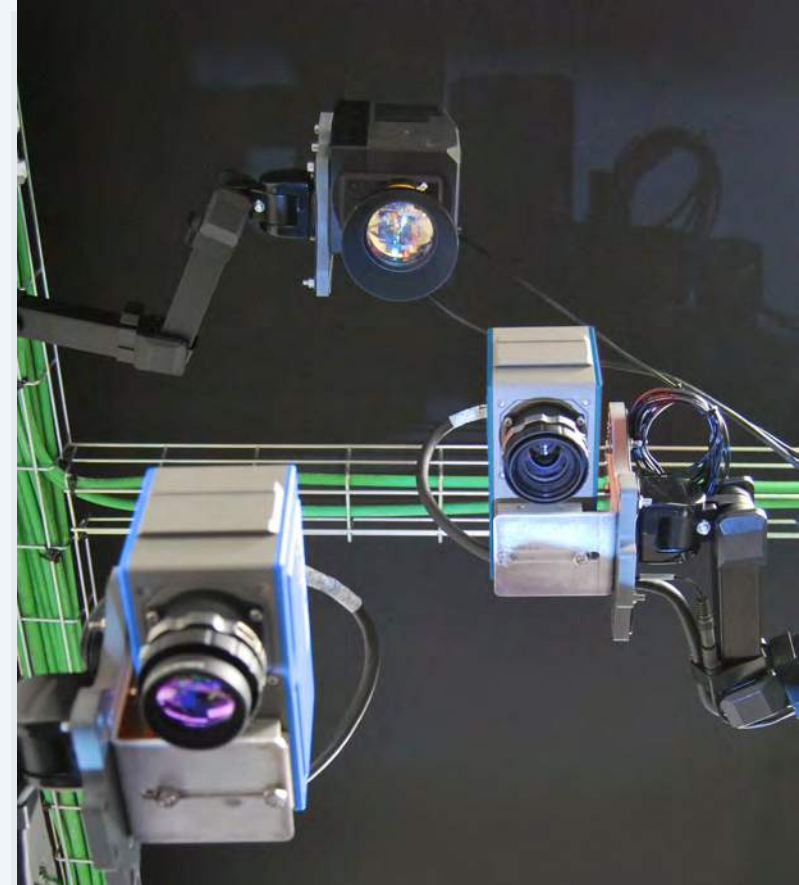
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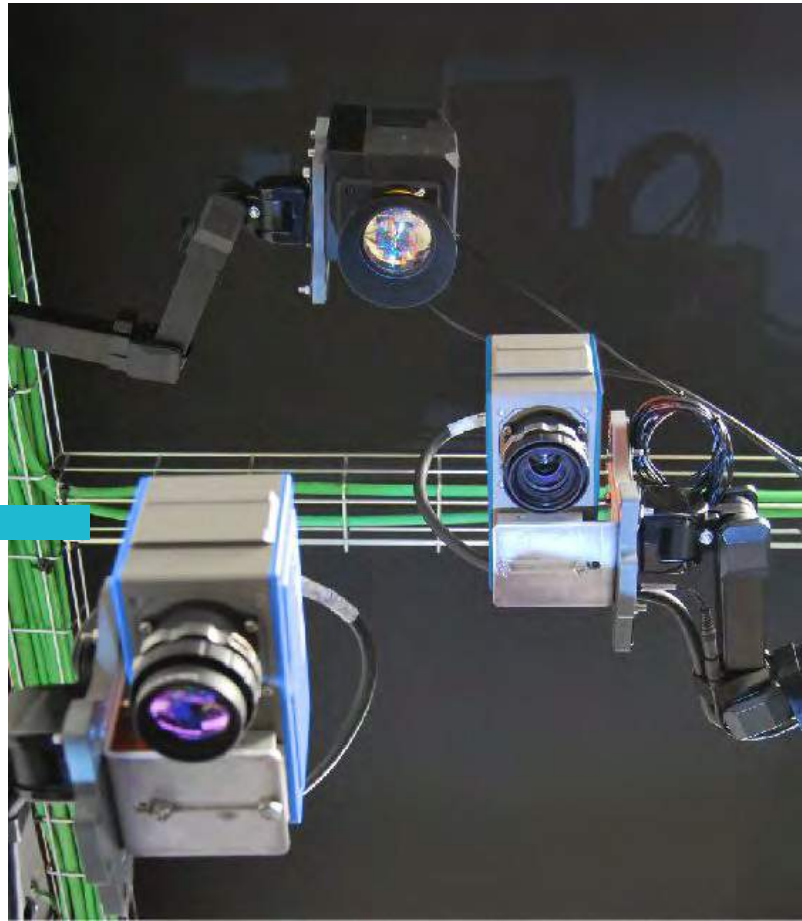www.**iris-eng**.com
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IN PRODUCTION LINES NIR & RAMAN ANALYSERS: CONTINUOUS AND REAL-TIME QUALITY CONTROL.

IRIS TECHNOLOGY SOLUTIONS

IRIS TECHNOLOGY SOLUTIONS

IRIS Technology Solutions is an engineering manufacturer of real-time process and quality control solutions with spectroscopy and artificial vision for the food, pharmaceutical, chemical, plastics, wood and other process industries.

We are a deep-tech engineering company that contributes to Industrial Digital Transformation with 4.0 solutions.

CONTENTS

Identification of raw materials and anomalies.

Particle size.

Pelletizing process control.

Control of uniformity and homogeneity of APIs and excipients.

End point determination in mixing and drying.

Fluorescence free Raman.

Determination of content uniformity for real-time release in line of mouthwashes.

Content prediction in core and coated tablets.

Crystallization process monitoring.

VISUM
SOLUTIONS

PHARMACEUTICAL, CHEMICAL AND COSMETICS

PAT* ANALYZERS ON PRODUCTION LINES AND IN REAL TIME

The **VISUM®** family of multiparameter analyzers enables real-time process monitoring and quality control at different critical points along the entire production chain.

BENEFITS OF INCORPORATING VISUM

➔ Non-destructive, non-invasive and intensive sampling.

➔ Accurate and objective results in real time and at any point of the line.

➔ Integration with plant management systems.

➔ Calibrations for all products, with established values and uncertainty range.

➔ Reduction of cycle time and risk of recalls.

➔ Real-time release of finished products.

➔ Compatible with 21-CFR11 and GMP standards.

GENERAL APPLICATIONS

➔ Identification of raw materials and detection of anomalies.

➔ Particle size determination.

➔ Pelletizing process control.

➔ Control of homogeneity and uniformity of content (active ingredients and excipients).

➔ Determination of blending and drying end point (residual moisture).

➔ Prediction of core and coated tablets content.

➔ Monitoring with fluorescence-free Raman spectroscopy.

➔ Quantification of in-line content in mouthwash manufacturing.

➔ Crystallization process monitoring.

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VISUM **Palm**

Raw material identification and anomaly detection

In the pharmaceutical industry, identification is the confirmation, within an acceptable range of accuracy, that the product tested is what is described on its label.

Traditional analytical techniques are intensive in time and specialized resources, a fast and industrial alternative is the portable (handheld) Visum Palm NIR analyzer, which allows this analysis to be performed in just seconds even through a transparent plastic bag.

NIR spectroscopy is also a technique for predicting undetermined anomalies in raw material, useful for avoiding problems with batches of raw material during the manufacturing process.

VISUM PALM Portable (handheld) NIR analyzer for at-line control or at different points of the process, from raw material to final quality control.

Determination of typical particle size

Our portable NIR analyzer VISUM Palm allows to determine the characteristic particle size of a powder sample, being possible to perform measurements directly through plastic bags in less than 5 seconds. Therefore, this method enables fast, non-destructive and simpler routine analysis, as well as the possibility to be implemented online for both automated process control and final quality control.

Control of the pelletizing process

In the pharmaceutical industry, there are many microgranulated formulations that are coated to achieve a time-controlled release of the active ingredient. During the pelletizing process of modified release dosage forms, the correct application of the coating (e.g. enteric release coating) will determine the subsequent efficacy of the drug and the mg/API release time of the drug and therefore controls are performed throughout this process to ensure the quality and thus the expected pharmacological action.

Currently, this control is performed during coating with samples taken from the coating equipment at different times and analyzed in the laboratory by HPLC or liquid chromatography, which is time- and resource-intensive and therefore does not allow rectifying the process in case of failures.

With a **Visum Palm** portable NIR analyzer, it **is possible to predict release times and potency at the line in just a few seconds**, without the need for chromatographic analysis and stopping the pelletizing process, which necessarily involves excessive lead times.

VISUM **NIR In-Line** & **Raman In-Line**

Real-time control of homogeneity and uniformity of contents (APIs and excipients)

VISUM Raman In-Line
Raman analyzer designed to be integrated into process machinery to monitor with high precision parameters with minimum concentrations and very complex matrices.

A critical point in the manufacturing process of pharmaceutical formulations is to ensure the **homogeneity** of the mixture of active ingredients and excipients. It is understood in the industry that if the formula is homogeneous there is **uniformity of content**, i.e., that the APIs and excipients are in the correct proportions.

Until now, the industry has been using laboratory analysis with HPLC or chromatography to perform such controls, despite the fact that this method involves a number of costs: sample preparation, laboratory material, qualified personnel in its handling and the time needed to obtain results. In addition, it is a procedure totally separated from the line - *offline* -, in time and space (laboratory), so it is not compatible with continuous manufacturing and, in the case of batch manufacturing, it significantly increases the lead time.

Visum's in-line NIR and Raman technology allows this control to be carried out in just a few seconds, integrating with process machinery such as blenders, tanks and piping to obtain precise and objective results in real time.

Raman or NIR technology?

The use of Visum NIR or In-Line Raman spectroscopy is determined according to the parameters to be analyzed, the concentrations in which they are found (% *w/w*) and the matrix, depending on the fluorescence and the nature of the different analytes that make them more or less visible with one or the other technology.

VISUM NIR In-Line
Multiparametric NIR analyzer suitable for integration with machinery and different working geometries in the plant.

VISUM NIR In-Line

End-point determination in blending and drying

With the Visum NIR In-Line analyzer it is possible to determine in real time and **without calibration the blending end point**, i.e. when the homogeneity of the formulation is achieved with a mathematical method traceable to the procedures established by the European Medicines Agency (EMA), efficiently replacing the need for laboratory analysis, human resources, materials and time.

NIR spectroscopy is also especially useful for the **quantification of water**, which is one of the most important analytes in the pharmaceutical industry. The **Visum NIR In-Line** analyzer can predict **residual moisture** in just seconds.

VISUM Raman In-Line

Prediction of core content and coated tablets

With a satellite (mobile) Visum In-Line Raman analyzer with probes specifically developed for each application, both the core - powder content - and the coated tablet can be effectively inspected and predicted.

The color of the coating, the presence of fluorescence and the variability in compaction are factors to be taken into account for the development of a predictive model of active ingredient content.

Therefore, at IRIS Technology, we perform prior technical tests with reference samples to mitigate the uncertainty associated with this type of ad-hoc development.

VISUM Raman In-Line
Raman analyzer designed to be integrated into process machinery to monitor with high precision parameters with minimum concentrations and very complex matrices.

VISUM Raman In-Line

Fluorescence-free Raman spectroscopy monitoring

The time-resolved Raman analyzer, unlike the continuous Raman, which excites with a continuous laser at 785 nm in an attempt to attenuate the fluorescence, operates with time resolution and a pulsed laser at 532 nm, achieving a better signal-to-noise ratio because the readout is taken in such a short time that the fluorescence has not had time to develop.

This advantage is especially necessary in the case of content quantification determinations in pharmaceutical samples since many active ingredients - and also many excipients - are particularly prone to generate fluorescence signals sufficiently intense to make quantitative determinations unfeasible in many practical cases.

IRIS Technology and TimeGate® bring the technology to mobile analyzer devices with specific probes, which are particularly useful in process control, both in the development of active ingredients and in production.
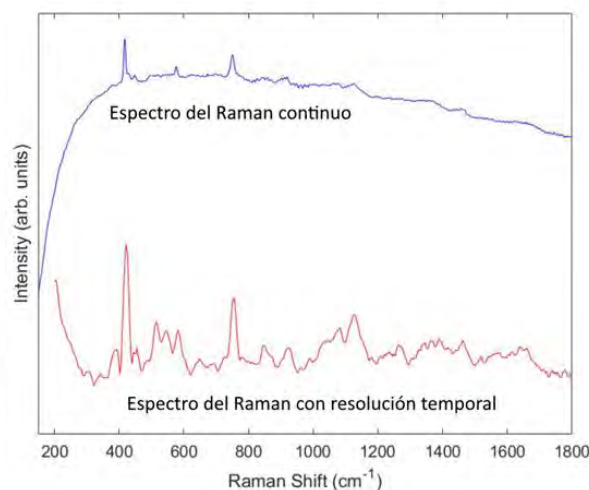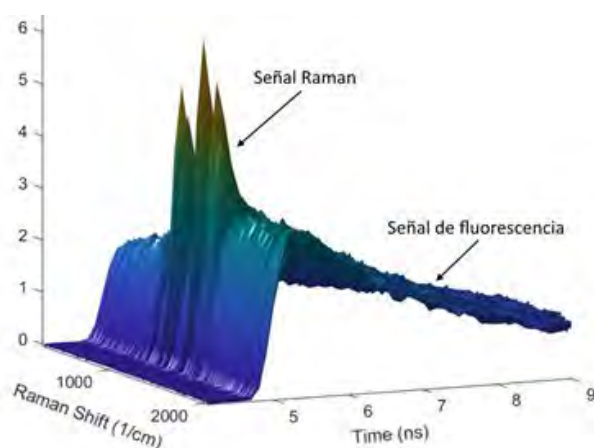
Comparison of the spectra obtained with a continuous Raman analyzer of one of the most prestigious brands on the market with those obtained with a time-resolved Raman analyzer, monitoring the fermentation of a yeast in glucose solution.

Content quantification for real-time online release of mouthwashes

Through the Visum Raman In-Line analyzer, suitable for aqueous media, it is possible to successfully predict formulations with very low concentrations of active ingredients (" 0.05%) in mouthwash solutions with a prediction error of less than 0.002.

Integrated into any plant management system, the Visum Raman In-Line analyzer is 21-CFR11 compliant and enables batch production to be released in real time.

VISUM Raman In-Line

Crystallization process monitoring

Crystallization is a widely used process in the manufacture of pharmaceutical forms. To improve the biological performance and economic benefits of the process, proper process control is necessary. However, in the crystallization process there are several factors that are difficult to control, such as nucleation or particle growth and agglomeration.

In-line Raman spectroscopy is an ideal tool to **monitor the crystallization process** in real time, since polymorphs exhibit spectral differences due to the arrangement of the molecules in the crystal and allows to obtain a wealth of information about the process. In addition, Raman spectroscopy provides pharmaceutical companies with a versatile tool to identify the right polymorph (or mixture of polymorphs) during drug development.
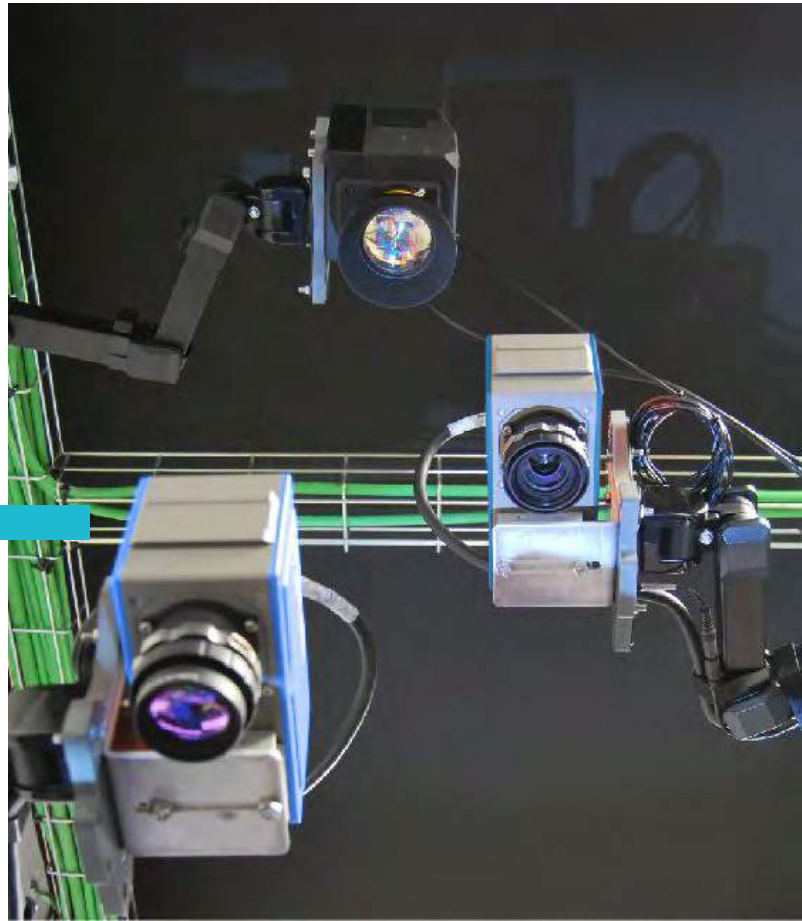
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REAL-TIME PROCESS AND QUALITY CONTROL FOR THE FOOD INDUSTRY.

IRIS TECHNOLOGY SOLUTIONS

Who We Are

IRIS Technology Solutions is an engineering manufacturer of real-time process and quality control solutions with spectroscopy and artificial vision for the food, pharmaceutical, chemical, plastics, wood and other process industries.

We are a deep-tech engineering company that contributes to Industrial Digital Transformation with 4.0 solutions.

CONTENTS

VISUM

V SOLUTIONS

NIR ANALYZERS **ON PRODUCTION LINES** AND IN REAL TIME

The **VISUM®** family of **multi-parameter analyzers** allows real-time process monitoring and quality control at different critical points along the entire production chain. They integrate photonic (**NIR**) and ICT technologies (machine learning and dedicated software).

BENEFITS OF INCORPORATING VISUM

➔ Non-destructive, non-invasive and intensive sampling. Its use does not require specialized personnel.

➔ Accurate and objective results in real time and at any point of the production line.

➔ Ad-hoc configurations for the production line.

➔ Real-time connection with plant PLCs for immediate process correction.

➔ Calibration for all products, with established values and uncertainty range.

➔ Early anomaly detection (EAD: Early Anomalies Detection).

➔ Reduction of cycle time and batch losses.

➔ Quality assurance according to GMP standards.

GENERAL APPLICATIONS

➔ Identification of raw material. Detection of anomalies and adulterations.

➔ Determination of nutritional composition -fat, proteins, moisture, sugars, flavorings or other parameters- in solid, semi-solid and liquid products.

➔ Determination of granulometry of flours and other powdery products (cocoa, coconut, powdered sugar, among others).

➔ Detection of foreign bodies in laminated bread and pastry doughs.

➔ Determination of the quality of both frying oil and crude oil (in terms of total acidity and polar compounds).

➔ Determination of the end point in different processes, e.g. cooking or baking.

VISUM

SOLUTIONS

VISUM **Palm** & VISUM **NIR In-Line**

Verification of raw material

By using our NIR analysis devices -VISUM Palm and VISUM NIR In-Line-, it is possible to identify the raw material in terms of its composition. In this way, it is possible to detect fraud attempts or any other anomalies that have an impact on its economic valuation, the production process and the quality of the final product, for example.

Determination of the quality of frying and crude oils

Our NIR analyzers -VISUM Palm and VISUM NIR In-Line- allow determining oil quality parameters in real time, such as acidity, peroxide and polar compounds, in order to know its quality and the optimal replacement point, with the consequent saving of this input in the process but maintaining the desired quality.

VISUM Palm Portable (handheld) NIR analyzer for at-line control at different points of the process, from raw material to final quality control.

Determination of moisture content of toasted bread

As it is known, when moisture values are below 3.5%w/w the toast is fragile and may break during transport; when they are above 4.5%w/w, the toast loses its crispiness.

Therefore, it is important to regulate the baking and check the moisture at the exit of the baking. By means of our in-line NIR analyzers -VISUM NIR In-Line-, a real-time, non-destructive, continuous monitoring of the moisture of toasted bread in the production line is achieved, replacing traditional analysis techniques, such as Karl Fischer or gravimetry and being able to rectify the process (oven temperature) in real time, avoiding loss of batches.

VISUM NIR In-Line
Multiparametric NIR analyzer suitable for integration into conveyor belts, tanks or pipelines for continuous analysis.

VISUM **Palm**

End point of the fermentation process

The fermentation process is critical to ensure the final quality of the product. It has factors that are difficult to control, such as yeast activity, and others that we can control and measure with our VISUM analyzers, such as pH, ethanol content and texture.

The **Visum Palm analyzer** is able to determine the fermentation end point, either based on quantitative process information provided by the laboratory or with a predictive model built from qualitative information (expert judgment).

The timely determination of the fermentation end point implies a reduction of the process time, energy savings and guarantees the standardization of the organoleptic qualities of the final product.

☘ EUROPASTRY

"_Having such a versatile tool as the **VISUM Palm** spectroscopic analyzer at **Europastry** is a revolution in the means to keep quality processes under control. In our case, it provides reliable and, above all, fast and economical information on the total acidity and the content of polar compounds in the frying oil of the production line, allowing us to make the most of this oil but always within the high quality standards that we impose on ourselves. At the same time, it provides us with very useful data such as the percentages of moisture/fat available in the product once it has been fried. By saving us laborious tasks in the laboratory, it allows our staff to concentrate on more value-added tasks, so the return on investment is clear. Our idea is to extend its use to the control of foreign bodies that are difficult to characterize and identify in doughs and raw materials, since the VISUM Palm is an open system in terms of the number and nature of the parameters it can characterize._**"**

Marina Diana
EUROPASTRY, S.A.

VISUM HSI
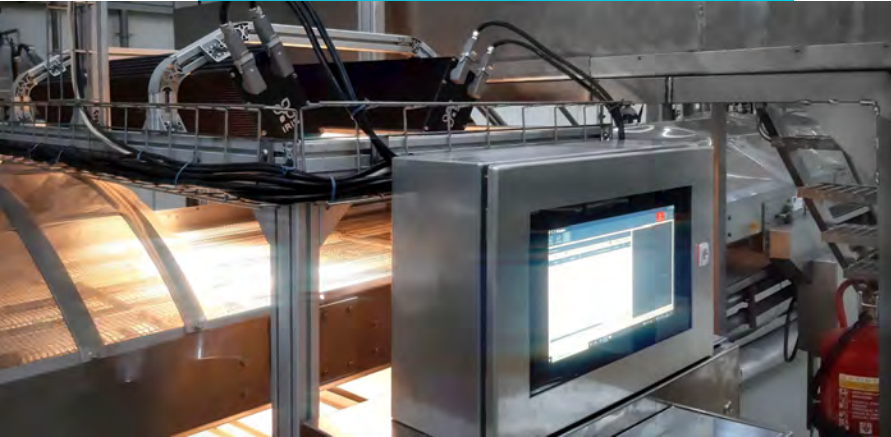
In-line determination of fat content in fried pastries

Our **VISUM HSI hyperspectral imaging analyzer** allows you to determine the fat content, as well as sugars and moisture, of fried pastries.

Traditionally, the value of fat content is obtained by tedious analytical protocols (Soxhlet method) that are time-consuming and resource-intensive. Analysis by hyperspectral imaging is an advantageous alternative, as it is a unit-based, real-time, non-destructive and rapid analysis technique.

Fat is a critical input in many industrial bakery products that brings the quality (taste and texture) of the product to consumers.

The HSI analyzer performs a **unit-by-unit physical and chemical inspection** of the product, which not only helps to standardize and control the fat content of the product - **to mitigate variations** - but also to optimize its use throughout the production process with significant savings during manufacturing and providing real-time information.

VISUM HSI: Hyperspectral NIR analyzer for on-line monitoring of physical-chemical parameters on a unit-by-unit and spatially distributed basis..

→ Lighting system adaptable to the characteristics of the line and the product.

→ Extract chemical information on a pixel-by-pixel basis for a complete analytical experience that is robust and secure.

→ Includes software for simple and intuitive self-calibration.

Software and chemometric analysis

Visum software is based on machine learning algorithms and chemometric analysis. It has a **user-friendly UX to cover all control needs.**
The image on the right shows how the system monitors (doughnuts) and reads the fat, giving an average of the analysis area. It also allows you to select a product unit to see its composition in detail.
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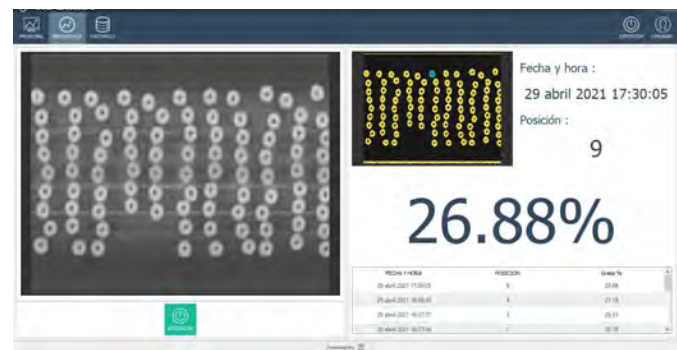
Hyperspectral Imaging System Calibration

The **Visum software** has a specific calibration module. To do this, once the equipment is installed, the product units must be passed through the measurement module and the laboratory reference parameters (in duplicate) must be entered into the system. Once this is done, the information is processed remotely by the **IRIS applications department** to calibrate the equipment according to the needs of the client and the product.
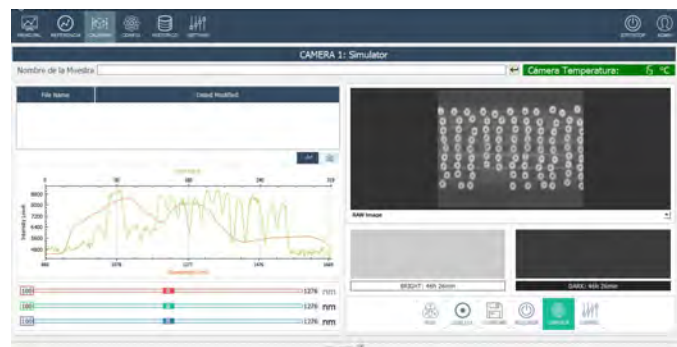
Detection of superficial foreign bodies

Through the implementation of our VISUM HSI analyzer it is possible to **detect pieces of plastic and other foreign bodies** -such as wood and metals- that may appear in bread and pastry dough, whose detection may escape the visual inspection of operators due to their reduced thickness and/or the low chromatic contrast with respect to the product. Its implementation makes it possible to reduce the ratio of false negatives, since this technology works in a spectrum of vision greater than that of human sight.

VISUM **NIR**

Real-time moisture and particle size control in flours with NIR technology

The **moisture of the flours** is a critical factor to be determined for the quality of the final product and as a control of raw material reception. According to Spanish legislation, it must be **less than 15%**, and in general, flours have a moisture content of around 14-14.5%.

Unlike the traditional oven-drying method for measuring moisture, which requires sample handling, laboratory resources, considerable time and specialized personnel, a NIR analyzer is a more efficient option that **provides results for multiple parameters in just seconds.** As it is multiparametric, it can incorporate the control of another important quality factor, particle size, which is important to be homogeneous among the different batches and can also be determined with the **Visum Palm** analyzer (when it is not important to know its distribution) in less than 5 seconds.

NIR technology, in all its versions, works by developing a machine learning algorithm trained to recognize the parameter of interest, the characteristics of the matrix and predict its value. In the case of flour, the same model for moisture with sufficient variability is able to give very accurate results on a large number of different flours and the need for calibration is minimal.

"*The development proposal we jointly presented was highly challenging. Despite the unforeseen and technical/scientific difficulties, we achieved a higher than expected goal and today **BIMBO Iberia** has **Visum** equipment that we use to achieve our mission: to produce delicious and nutritious food.***"**

Juan A. Mena
BIMBO Iberia.

VISUM
SOLUTIONS

REAL TIME QUALITY CONTROL ON PRODUCTION LINES

The **VISUM®** family of **multi-parameter analyzers** enables real-time process monitoring and quality control at different critical points along the entire production chain. They integrate photonic technologies (**NIR**), **Artificial Vision** and ICT (machine learning and dedicated software).

BENEFITS OF INCORPORATING VISUM

➔ Reduction of time and resources for inspection or sensory evaluation and laboratory analysis. Its use does not require specialized personnel.

➔ Connection and integration with plant information management systems.

➔ Non-destructive, non-invasive and intensive sampling.

➔ Accurate and objective results in real time (minimum human intervention) and at any point of the production line.

➔ Ad-hoc configurations for the production line.

➔ Calibration for all products, with established values and uncertainty range.

➔ Fast release of finished products.

➔ Quality assurance according to GMP standards.

GENERAL APPLICATIONS

➔ Verification of raw material.

➔ Detection of physical or superficial defects with Artificial Vision and deep learning.

➔ Determination of nutritional composition (acidity, fat content, moisture, pH, °Bx, other parameters) in solid, semi-solid and liquid products.

➔ End point determination in different processes based on critical quality parameters.

➔ Detection of foreign bodies for sorting or rejection.

VISUM **SOLUTIONS**

VISUM **HSI**

Complete physical chemical analysis for fresh fruits and vegetables in real time.

The VISUM HSI NIR Hyperspectral Imaging System allows to monitor **unit by unit** the product passing on a conveyor belt extracting information of its chemical composition (Ph, acidity, fat, moisture, °Bx, soluble solids, sugars and other critical parameters) in real time, as well as detecting and classifying according to physical, morphological and texture defects.

It is a **complete physical-chemical control system** that avoids laboratory time and visual inspection, optimizing the control of all product units and integrates to any PLC line or rejection system.

VISUM HSI: Hyperspectral **NIR analyzer** for on-line monitoring of physical-chemical parameters on a unit-by-unit and spatially distributed product basis.

VISUM **NIR In-Line** & VISUM **Palm**

Control of process parameters in real time the case of Brix degrees (°Bx).

In the fruit and vegetable industry, as well as for fruit products (juices, purees, concentrates, among others), a critical value either to determine quality standards, commercialization, ripening or to adjust the recipe of certain food preparations, are the Brix degrees (°Bx).

VISUM **NIR In-Line**

Currently, in the vast majority of the industry this °Bx control is performed by traditional laboratory methods, where "representative" samples are taken from a batch and subjected to a conventional destructive technique such as refractometry or HPLC analysis.

VISUM NIR In-Line Multiparametric NIR analyzer suitable for integration into conveyor belts, tanks or pipelines for continuous analysis.

This method, in addition to having a cost (specialized personnel, time and equipment), is not sufficient in view of the high variability in the quality attributes present in fruit and vegetable lots, nor the need of the fruit and vegetable derivatives processing industry to monitor this parameter in real time and be able to adjust the other components of the "recipe" of its product, according to the parameter of interest.
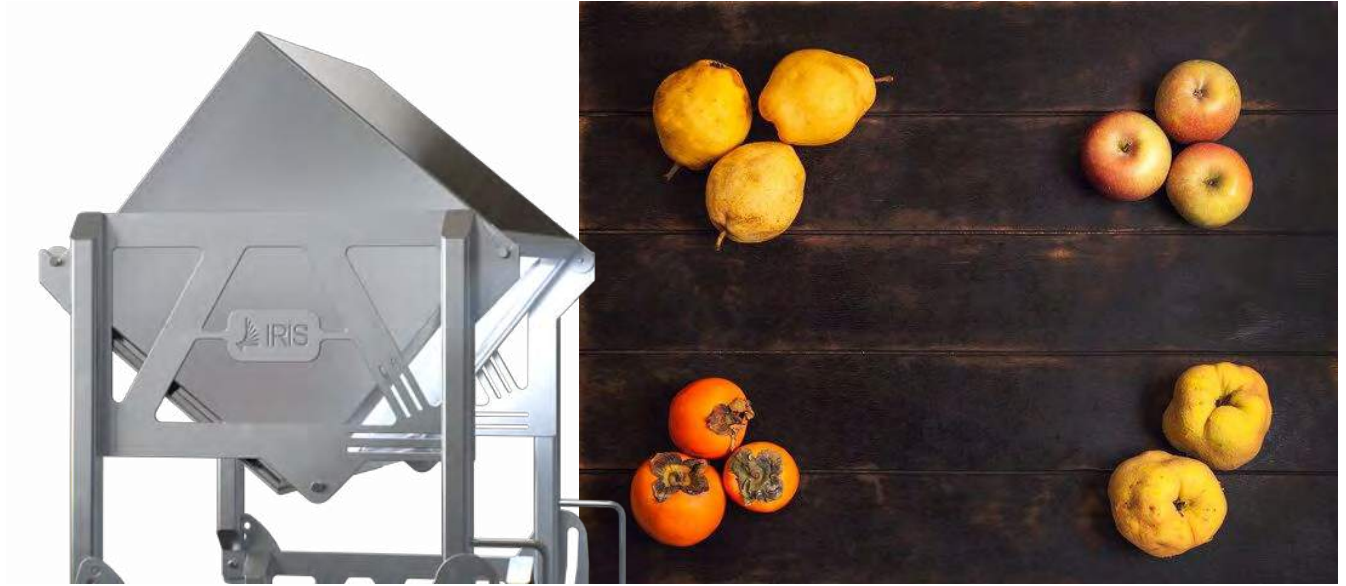
In other words, monitoring this parameter online for the processing industry means optimizing all process inputs and standardizing the quality of the final product. For fruit and vegetable growers, analyzing °Bx with a Visum Palm portable NIR analyzer, for example, is useful to save lab time, determine their marketability and even improve the terms of trade with their customers and guarantee more quality to the domestic and export markets. At the same time, a NIR analyzer, in any of its versions, is capable of performing, depending on its concentration, added measurements such as total acidity, pH, vitamins and the concentration of other analytes of nutritional or organoleptic interest.

VISUM PALM Portable (handheld) NIR analyzer for at-line control or at different points of the process, from raw material to final quality control.

VISUM VISUM **DeepSight**

VISUM DeepSight:
Analyzer and quality control 4.0 with artificial intelligence, applying neural networks (**deep learning)** that allows to obtain results where machine vision alone is not capable.

Easy, fast and economical integration to the production line for quality analysis -**morphological and/or colorimetric**- based on the information extracted from the images, in real time and non-destructive.

Vision of surface defects with Deep Learning.

The **Visum DeepSight** analyzer is a robust industrial Artificial Vision System that uses **neural networks to distinguish and classify anomalies** or characteristics of different fresh fruit and vegetable products (shape, color, breaks, rottenness, depressions and others) and tolerates natural variations in complex patterns, thus combining in a single system the speed of computerized systems, as well as the level of detail and uniqueness of visual inspection, which it replaces.
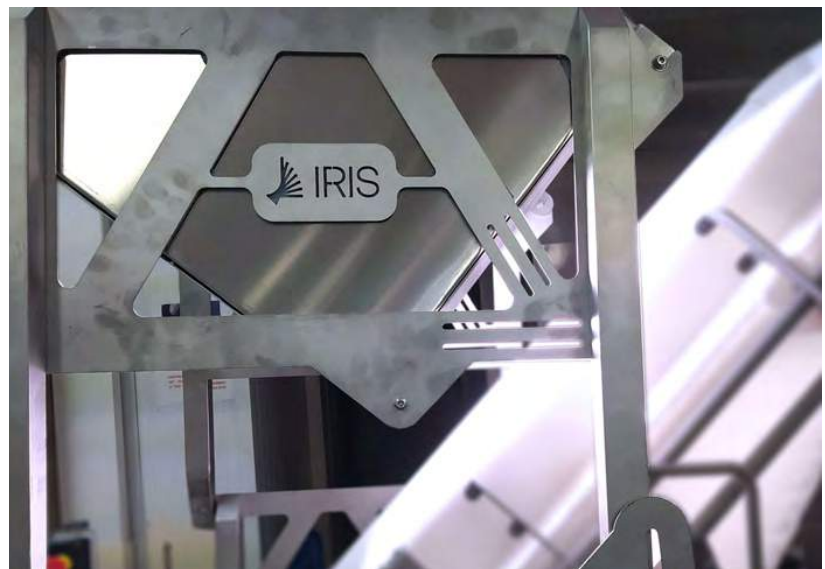
VISUM **NIR In-Line**

In-Line quality control of olives and olive pomace.

The **Visum NIR In-Line** analyzer is a powerful and reliable tool that allows the mill to monitor in-line and optimize different processes such as olive pomace production (**moisture, fat and acidity**) without having to resort to traditional sampling and laboratory analysis techniques.

In addition, IRIS Technology's **NIR** sensor is useful for determining the same quality parameters on olive conveyor belts as for olive pomace, continuously providing an **average reading per area as product flow is detected**, thus optimizing control prior to any hopper or weighing system.

Unlike other sensors, **Visum NIR In-Line** allows to reliably process all the physical-chemical variability of the olive, from harvesting to the last stage of fruit ripening. It has the ability to export results to any olive mill management system, as well as to view them quickly and intuitively in the Visum control software, which can be configured to the client's needs.

VISUM NIR In-Line
Multiparametric NIR analyzer suitable for integration into conveyor belts, tanks or pipelines for continuous analysis.

VISUM
SOLUTIONS

QUALITY AND PROCESS CONTROL IN THE DAIRY INDUSTRY:

IN-LINE AND REAL-TIME NIR ANALYZERS

The VISUM® family of **multi-parameter analyzers** allows real-time process monitoring and quality control at different critical points along the entire production chain. They integrate photonic (NIR) and ICT technologies (machine learning and dedicated software).

BENEFITS OF INCORPORATING VISUM

➔ Savings in time and resources for laboratory control.

➔ Its use does not require specialized personnel.

➔ Communication with the plant's information management systems.

➔ Non-destructive, non-invasive and intensive sampling.

➔ Accurate and objective results in real time and at any point of the production line.

➔ Ad-hoc configurations for the production line.

➔ Calibration for all products, with established values and uncertainty range.

➔ Quality assurance according to GMP standards.

GENERAL APPLICATIONS

➔ Verification of raw material. Detection of anomalies and adulterations.

➔ Determination of nutritional composition: fat, proteins, lactose, total solids and other parameters.

➔ End point determination in different manufacturing processes and batch standardization.

VISUM **NIR In-Line** & VISUM **Palm**

Raw material control and batch standardization

The **Visum NIR In-line** analyzer is an excellent tool for in-line control of natural variations in the nutritional composition of different batches of milk. This equipment is essentially a NIR spectrophotometer that can be integrated to any type of tank, reservoir or pipeline, as well as via network or WiFi to the plant management systems.

The Visum NIR In-line analyzer allows to determine **multiple parameters simultaneously** (1.5 and 3 seconds) of any type of milk-based products (juices, smoothies, yogurts, for example) adjusting in real time the other components of the recipe, optimizing the whole analytical process and standardizing the composition of the final product.

VISUM NIR In-Line: In-line multiparametric NIR analyzer for continuous and real-time monitoring of liquid products.

Control of the skimming process

The **end point of the skimming** process is currently determined by traditional laboratory methods from manually extracted samples. With a Visum NIR In-Line analyzer integrated in the tank, it is possible to predict the end point of the skimming process on site and in real time.

Quality control of dairy powders

The **Visum Palm** (handheld NIR) analyzer is ideal for the analysis of dairy powders without resorting to traditional laboratory techniques. With a 10 mm spot and 8 hours of autonomy, Visum Palm can be used anywhere in the plant to predict in just seconds the **fat, protein, moisture, ash, lactose and acidity content** in different powders, as well as particle size and residual moisture.

It is also possible to determine in real time the amount of **vitamins and minerals** found in the formula in a concentration higher than 0.1 % w/w.

VISUM PALM: Portable (handheld) NIR for quality control at-line or at different points of the process, from raw material to final quality control.

VISUM **NIR InLine &** VISUM **Palm**

NIR technology as a tool for real-time control of cheese manufacturing processes.

Near infrared spectroscopy can be used to control the quality and monitor the manufacturing process of various types of cheese. This technology helps to optimize cheese production to save costs and avoid waste.

Curd monitoring

With the help of NIR spectroscopy it is possible to monitor the different stages of the coagulation process up to curd production, as each stage has a different spectral profile.

Monitoring of the curd-whey separation process and other processes.

During cheese production, a critical process is that in which **the curd is separated** from the whey. In the case of hard cheeses, such as gouda, the curd is separated into blocks and stacked so that the water drains slowly. In many cases, fermentation is allowed to continue to obtain the desired pH. Salt is added to many varieties before pressing or later in the rind. This removes more water, improves the flavor and prevents the cheese from spoiling. The cheese is then pressed, usually in a circular shape. They are then stored for more or less time, depending on the cheese variety.

NIR spectroscopy is able to monitor the **whey to curd ratio**, control the process before pressing, after pressing and after salt treatment to identify when the optimum **moisture** (water content) and **fat content** are reached.

VISUM SOLUTIONS

FISH & SEAFOOD

REAL-TIME AND IN-LINE QUALITY CONTROL

The **VISUM®** family of analyzers combines **NIR** (Near infrared), **Hyperspectral** and **Artificial Vision** technology for different tasks of chemical and physical control and inspection in production lines.

BENEFITS OF INCORPORATING VISUM

➔ Savings in laboratory analysis times, as well as in resources for inspection or evaluation of physical defects.

➔ Its use does not require specialized personnel.

➔ Connection and integration with the plant's information management systems.

➔ Non-destructive, non-invasive and intensive sampling.

➔ Accurate and objective results in real time and at any point of the production line.

➔ Ad-hoc configurations for the production line.

➔ Integration with production line rejection system.

➔ Quality assurance according to GMP standards.

GENERAL APPLICATIONS

➔ Real-time detection of visible defects such as bruises, parasites, skin remains, viscera, cuts, among others expressed by color and/or shape.

➔ Real-time detection of foreign bodies (plastics, cardboard, metals or others).

➔ Early detection of anomalies or fraud (EAD: Early Anomalies Detection).

➔ Monitoring of chemical composition of both fresh and frozen products.

➔ Detection and classification of sulfites in fish products.

➔ Determination of nutritional quality of fish oils and fishmeal.

VISUM **DeepSight**

VISUM DeepSight: Analyzer and quality control 4.0 with artificial intelligence, applying neural networks (deep learning) that allows to obtain results where machine vision alone is not capable.

Easy, fast and economical integration to the production line for quality analysis **-morphological and/or colorimetric-** based on the information extracted from the images, in real time and non-destructive.

Includes a computer module with display and Visum software.

Detection of surface defects

Our VISUM DeepSight device is ideal for the inspection of various products - such as fillets, whole fish or various seafood - to distinguish a wide variety of defects, both colorimetric, morphological and compositional (embedded plastics, skin remains, bones, bruises, parasites, paper and cardboard, metals and viscera).

This method is very robust to sources of variability uncorrelated with anomalies, therefore, **classification accuracy is greater than 98%**.

The DeepSight inspection system is **an alternative to visual inspection by operators** and is configured based on quality criteria provided by each customer.

VISUM SOLUTIONS

VISUM **HSI**

Detection of foreign bodies in fish products

The implementation of our VISUM HSI analyzer, which uses the **hyperspectral imaging** technique in the SWIR range, facilitates the detection of foreign bodies from the seabed, such as fish, shells, stones, other arthropods, net fragments, among others, which are visually little different from the product to be processed and, therefore, may escape visual inspection. Its use implies the reduction of false negatives, since this technology works in a wider vision spectrum than human sight or artificial vision.

In addition, the VISUM HSI is able to detect **plastic packaging residues** in fish fillets and slices in real time and efficiently.

Finally, HSI extracts **chemical information pixel by pixel, making it a powerful in-line analytical tool.**

Detection and classification of sulfites in shellfish

VISUM HSI: NIR Hyperspectral Analyzer for the in-line determination of **foreign bodies** (shells, stones, other arthropods, net fragments), unit by unit, when the fish product is transported **on a belt without overlapping**. It also allows the estimation of **morphological indicators**, e.g. size and shape of fillet, fish and/or shellfish and **chemical composition**.

VISUM HSI allows, by means of real-time hyperspectral image analysis, to detect the amount of sulfites present both in the meat and on the outside of seafood products on a conveyor belt, unit by unit, and to distinguish them on a **classificatory scale** (not quantitative) according to the criteria and parameters/ranges provided by the client.

VISUM HSI communicates with PLC and rejection systems. Its incorporation allows to pre-select products prior to their transport from the production farms to the factories, thus **avoiding problems related to the presence of sulfites and the over-application of preservatives** in the production processes.

Quality control in fishmeal and fish oils

The **Visum Palm** portable NIR analyzer is an ideal instrument for quality control of fishmeal and fish oil, both to detect contaminants and to determine various organoleptic properties and nutritional value.

For example, it is possible to determine in just seconds parameters such as: acidity, moisture, protein, fat content or **EPA** and **DHA** (Omega 3 acids).

In the production of high-quality flours, it is important to control cooking and drying (at 90°C or less), as this increases the nutritional value, improves digestibility and destroys numerous bacteria. An additional measurement is the determination of **residual moisture.**

VISUM PALM Portable (handheld) NIR analyzer for at-line control or at different points of the process, from raw material to final quality control.

VISUM SOLUTIONS

REAL-TIME **NIR ANALYSERS** ON PRODUCTION LINES

The **VISUM®** family of multi-parametric analysers allows real-time process monitoring and quality control at different critical points along the entire production line on different matrices (solids, semi-solids and liquids). They integrate photonic technologies (NIR) and ICTs (machine learning and dedicated software).

ADVANTAGES OF INCORPORATING VISUM

➔ Non-destructive, non-invasive and intensive sampling, unit by unit. Its use does not require specialized personnel.

➔ Accurate and objective results in real time and at any point of the production line.

➔ Ad-hoc configurations for the production line.

➔ Real-time connection with the plant PLCs for immediate process correction.

➔ Calibrations for all products, with established values and uncertainty range.

➔ Early anomaly detection (EAD: Early Anomalies Detection).

➔ Reduction of cycle time, batch losses and risk of claims.

➔ Rapid release of finished products.

➔ Quality assurance according to GMP standards.

GENERAL APPLICATIONS

Our analysers allow the control of critical parameters in production processes, for example:

➔ Real-time detection of visible defects such as bruises, parasites, skin remains, viscera, among others.

➔ Real-time detection of foreign bodies such as plastics, wood, paper and others, provided they are not transparent.

➔ Undetermined Early Anomalies Detection (EAD)

➔ Monitoring of nutritional parameters of fishery products, both fresh and frozen.

➔ Detection of adulteration in raw materials or finished products.

VISUM **Palm**

VISUM PALM Portable (hand-held) NIR for at-line control or at different points of the process, from raw material to final quality control.

Adulteration detection in minced meat

Our VISUM Palm NIR analyser allows the analysis of minced meat samples for the detection of adulterations, being a non-destructive, objective and real-time method. Adulterations in minced meat may not be detectable to the human eye and their biochemical analysis requires specific and complex laboratory techniques and equipment, resulting in increased costs. Failure to detect adulterations - such as horsemeat fraud - can have adverse economic and brand image consequences. Our models are capable of detecting adulteration in minced meat samples at concentrations as low as 3%w/w of adulterant. In addition, they enable you to define the desired product characteristics by establishing a "chemical fingerprint" with the spectra of products with the desired quality. In this way, future frauds can be detected.

Determination of key parameters in sausages

Through the implementation of our NIR analysers, it is possible to determine key quality parameters in sausages -moisture, fat, protein- by means of a non-destructive method and in real time, making it possible to replace traditional methods of analysis that require a large investment of time and resources.

VISUM SOLUTIONS

VISUM **HPR-S1**

Verification of lean/fat ratio in raw material for meat product manufacture

The HPR system is capable of analysing a sample of raw material for the meat industry and verifying the lean/fat ratio of the raw material received. This equipment makes it possible to standardise and optimise the meat to fat ratio in all types of meat products.

In addition, the HPR equipment can perform the following processes

➔ Fraud and adulteration detection.

➔ Continuous analysis of fat, protein and moisture content in meat cuts and minced meat.

➔ Continuous detection of foreign bodies such as plastics, cardboard, metals, bones and cartilage.

➔ Early warning in case of unexpected changes in product composition.

HPR-S1

Portable NIR
hyperspectral imaging (HSI) analyser designed to work where product information on chemical composition and spatial information is required at different locations in the factory.

IRIS TECHNOLOGY SOLUTIONS

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VISUM
SOLUTIONS

WOOD, PLASTICS & RECYCLING:
REAL-TIME QUALITY CONTROL
AND PROCESSES.
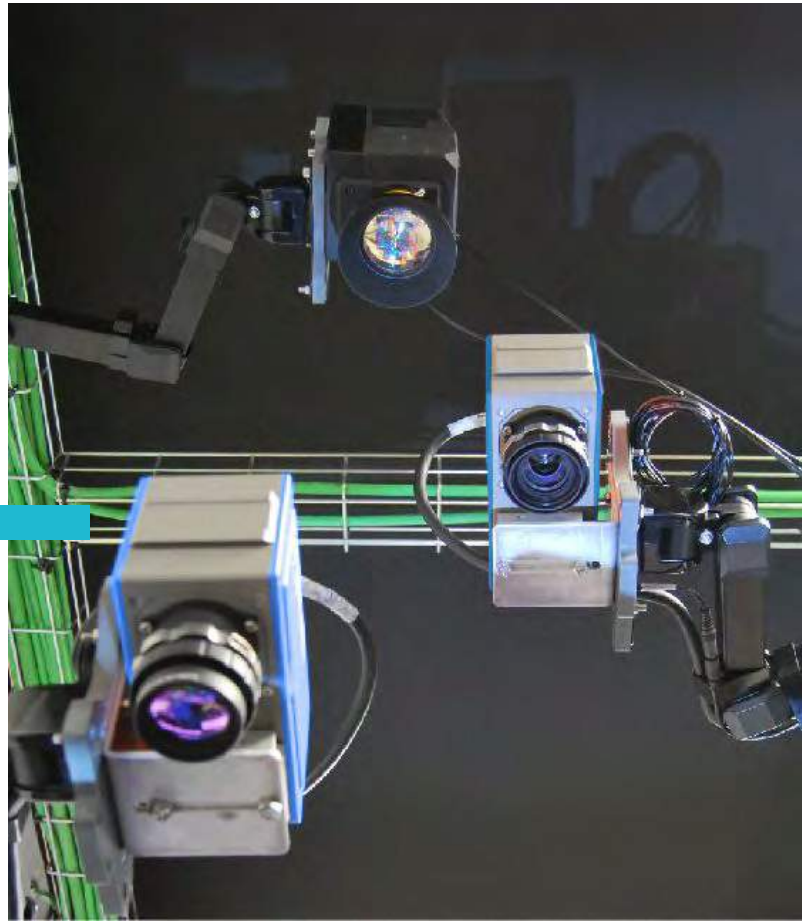
IRIS TECHNOLOGY SOLUTIONS

Who We Are

IRIS Technology Solutions is an engineering manufacturer of real-time process and quality control solutions with spectroscopy and artificial vision for the food, pharmaceutical, chemical, plastics, wood and other process industries.

We are a deep-tech engineering company that contributes to Industrial Digital Transformation with 4.0 solutions.

CONTENTS

VISUM

♥ SOLUTIONS

REAL-TIME PROCESS AND QUALITY CONTROL IN THE PLASTICS INDUSTRY

The VISUM® family of multiparameter analyzers allows the monitoring of different processes and quality control in real time. It integrates optics, spectroscopy and artificial intelligence.

BENEFITS OF INCORPORATING VISUM®

➔ Non-destructive, non-invasive and intensive sampling. Its use does not require specialized personnel.

➔ Accurate and objective results in real time and at any point of the production line.

➔ Ad hoc adjustments for the production line.

➔ Real-time connection with the plant PLCs for immediate process correction.

➔ Calibrations for all products, with set values and uncertainty range.

➔ Early anomaly detection (EAD).

➔ Reduction of cycle time, losses and claims.

➔ Quality assurance according to GMP standards.

GENERAL APPLICATIONS

➔ Identification, classification and separation of polymers.

➔ Real time control of the polymerization process.

➔ Water content monitoring.

➔ Recycling.

VISUM SOLUTIONS

VISUM Raman In-Line Raman analyzer designed to be integrated into process machinery to monitor with high precision parameters with minimum concentrations and very complex matrices.

In-line polymerization process control

The polymerization process or production of plastics can be **monitored in-line inside the reactor** in order to continuously analyze the different chemical reactions that form the polymer, detect anomalies for process correction, as well as to determine the end point of the process.

Currently there is no practical way to take samples during the process, as the temperature is usually high (100-200 °C) and the material very viscous. The end point is when all the reagents have been converted into the desired polymer, i.e. the reaction has been completed without any residues other than those that are unavoidable.

Monitoring consists of introducing **an integrated probe** to the NIR or In-Line Raman analyzer. The usefulness is to know what is happening inside the reactor to adjust the parameters - reagent addition, temperature adjustment - in order to achieve, in the shortest possible time, the optimal end point, with the consequent reduction of lead time and energy consumption.

¿Raman or NIR technology?

The use of **NIR or Raman In-Line Visum spectroscopy** is determined according to the parameters to be determined and the matrix, depending on the fluorescence and the nature of the different compounds that make them more or less visible with one or the other technology.

VISUM NIR In-Line
Multiparametric NIR analyzer suitable for integration into conveyor belts, tanks or pipelines for continuous analysis.

VISUM PALM

Polymer identification and classification

Because NIR spectroscopy requires no sample preparation and is non-destructive, it is an excellent in-line or at-line analytical control tool for the **identification and separation of plastics** to obtain quantitative and qualitative parameters.

This control can be performed at-line with a **Visum Palm** (portable NIR) analyzer that includes models to characterize a large number of polymers, including PET, HDPE, LDPE, PP, PS, PVC, PC, ABS, to name a few.

The NIR is a useful tool for the identification of **polymeric waste for recycling** as it allows the characterization and valorization of waste plastic material as raw material in other processes and industries.

VISUM PALM Portable (handheld) NIR analyzer for at-line control or at different points of the process, from raw material to final quality control.

VISUM NIR In-Line & VISUM HSI

VISUM HSI: Hyperspectral NIR analyzer for on-line monitoring of physical-chemical parameters on a unit-by-unit and spatially distributed product basis.

Determination of the water content in the pellet at the exit of the polymerization process.

Practically all plastic used for composite molding is manufactured in pellet form. An undesirable by-product of the reaction is the **water formed in the process**.

The **Visum HSI** and **Visum NIR In-Line** analyzers are two ideal control tools for monitoring and determining the water content down to minute amounts as the product passes through a conveyor belt, alerting the manufacturer if excess water is detected to prevent the production of defective batches or future returns.

VISUM SOLUTIONS

PLYWOOD AND PARTICLEBOARD MANUFACTURING

REAL-TIME HYPERSPECTRAL IMAGE ANALYZER

The **VISUM®** family of multi-parameter analyzers allows real-time process monitoring and quality control at different critical points along the entire production line. They integrate photonic (NIR) and/or hyperspectral imaging technologies and ICT (machine learning and specific software).

BENEFITS OF INCORPORATING VISUM

➔ Non-destructive, non-invasive and intensive sampling. Its use does not require specialized personnel.

➔ Accurate and objective results in real time and at any point of the production line.

➔ Ad hoc adjustments for the production line.

➔ Real-time connection with the plant PLCs for immediate process correction.

➔ Calibration for all products, with set values and uncertainty range.

➔ Early anomaly detection (EAD).

➔ Reduction of cycle time, losses and claims.

➔ Quality assurance according to GMP standards.

GENERAL APPLICATIONS

➔ Supervision of various processes in the production of chipboard, e.g. inspection of the quality of the board coating process.

➔ Control and classification of the chipboard curing factor.

➔ In-line control of product distribution to ensure homogeneity and desired quantity of components in each product unit.

➔ Detection of defects imperceptible to the human eye and/or traditional machine vision cameras.

➔ Detection of foreign bodies -metals, rubber, among others- based on their morphology or composition.

➔ In-line characterization of raw material (chips) for process control.

VISUM HSI
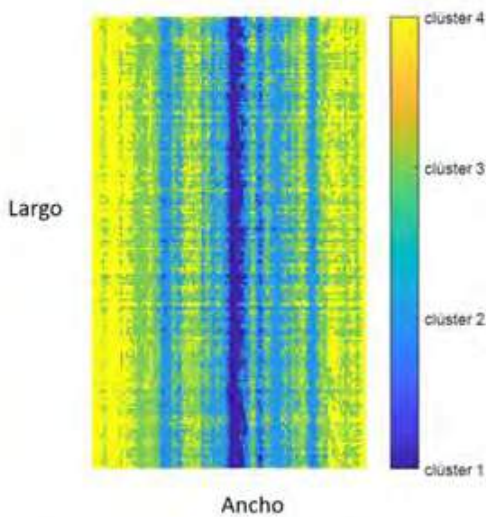
Detection of defects in chipboard coating curing

By implementing our **VISUM HSI** hyperspectral image analyzer, it is possible to inspect the entire board surface with machine learning tools capable of **classifying and determining the board cure factor**, unit by unit and pixel by pixel, non-destructively and in real time.

Its installation replaces quality control based on destructive techniques, consisting of chemical manipulations and visual inspection by an operator, limited to a few randomly selected samples.

The accuracy of the VISUM HSI system's determination of coating cure quality is more than 98% of the category. If defects are detected, the system generates an alarm that leads to rejection of the defective unit and inspection of the machinery in order to adjust the process parameters to correct the anomaly.

VISUM HSI: Hyperspectral NIR analyzer for In-line monitoring of physical-chemical parameters on a unit-by-unit and spatially distributed product basis.
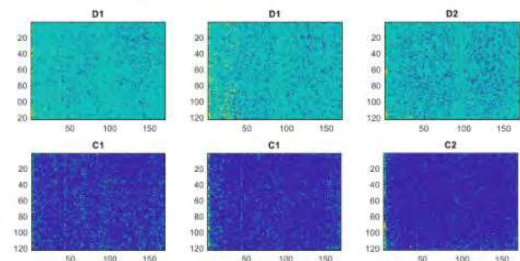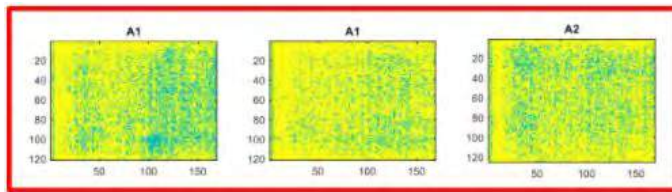
VISUM HSI

Moisture control in the impregnation line

The Visum HSI inspection system is able to monitor in two ranges (Vis-NIR and NIR) the **homogeneity and the amount of moisture** in the impregnated paper. Working in real time and connected to the PLC of the line, it identifies the paper reference (type/color) and performs a complete reading without the need for destructive or traditional quality controls.

The illumination system adapts to the line width and device calibration is minimal.

Overall, Visum HSI successfully predicts the level and distribution of moisture in the impregnated paper to detect anomalies in real time and avoid losses or claims.

VISUM HSI

Characterization of wood chip flow

The Visum HSI inspection system operating in the SWIR range is capable of **monitoring and quantifying the amount of product** entering the board production (chips of pine, eucalyptus, poplar, among others, including subclasses) providing critical information to the subsequent processes of **defiberization and gluing**, prior to pressing, as these must be adapted to the wood species and the properties of the chips to ensure uniform quality.

In this way, the manufacturer can adjust process parameters, resin usage and times with high-precision analytical information on a continuous basis.

The system is able to determine by area other useful parameters such as moisture and - provided there is product distribution - to detect plastics, gums and other foreign elements that often generate problems in the final product quality and visible defects on the surface of the board.

VISUM SOLUTIONS

RECYCLING AND CIRCULAR ECONOMY

REAL-TIME PROCESS AND QUALITY CONTROL FOR THE CIRCULAR ECONOMY

The VISUM® family of multi-parameter analyzers enables real-time process monitoring and quality control. It integrates optics, spectroscopy, and artificial intelligence in the development of solutions for the Circular Economy.

BENEFITS OF INCORPORATING VISUM®

➜ Non-destructive, non-invasive and intensive sampling. Its use does not require specialized personnel.

➜ Accurate and objective results in real time and at any point of the production line.

➜ Ad hoc adjustments for the production line.

➜ Real-time connection with the plant PLCs for immediate process correction.

➜ Calibrations for all products, with established values and uncertainty range.

GENERAL APPLICATIONS

➜ Monitoring and quantification of organic waste.

➜ Identification and separation of plastics.

➜ Recycling of fabrics: classification of textile fibers.

VISUM HSI

Organic waste monitoring

In organic waste recycling lines, not everything that passes through is necessarily organic matter. A fast and efficient way to know the distribution of waste passing over the belt is with hyperspectral NIR technology.

With the Visum HSI system, it is possible to monitor online the organic/inorganic content in the recycling plant to predict and adjust bioreactor parameters based on the ratio, optimizing its performance.
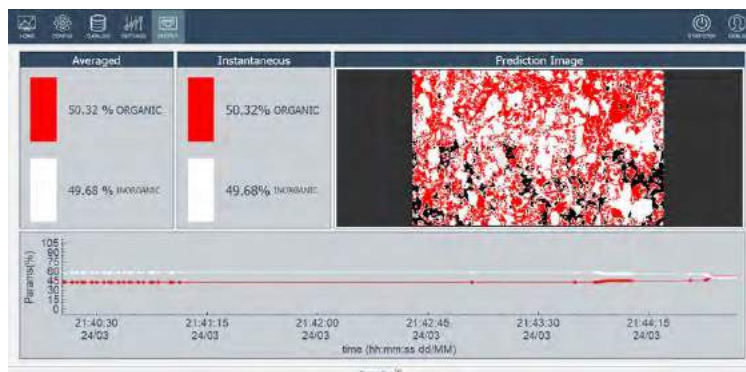
VISUM HSI: Hyperspectral NIR analyzer for in-line monitoring of physical-chemical parameters on a unit-by-unit basis and with spatial distribution.

VISUM HSI

Textile recycling

Textile products have individual spectral characteristics that can be used for classification. Textiles are based on three types of fibers: natural, man-made and synthetic.

Due to the differences in the chemical composition of each fiber type and how they are expressed in the NIR (Near-Infrared) viewing range, the Visum HSI hyperspectral imaging system can identify each of them and classify them automatically. Visum HSI in turn allows to obtain detailed information about the proportions of each category (% w/w), for the commercialization and valorization of the textile material for other industries or processes.

VISUM SOLUTIONS

VISUM PALM

Polymer identification and classification

Because NIR spectroscopy does not require sample preparation and is non-destructive, it is an excellent in-line or at-line analytical tool for the identification and separation of plastics to obtain quantitative and qualitative parameters.

This control can be performed at-line with a Visum Palm (portable NIR) analyzer that includes models to characterize a large number of polymers, including PET, HDPE, LDPE, PP, PS, PVC, PC, ABS, to name a few.

The NIR is a useful tool for the **identification of polymeric waste for recycling** as it allows the characterization and valorization of waste plastic material as raw material in other processes and industries.

VISUM PALM Portable (handheld) NIR analyzer for at-line control or at different points of the process, from raw material to final quality control.

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