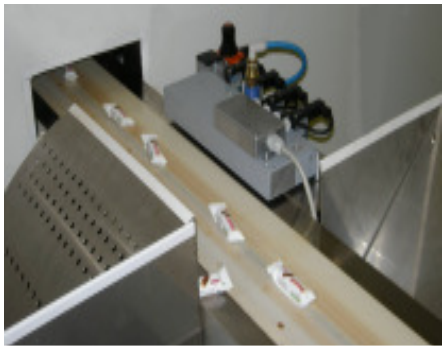
Quality Control via Camera Inspection for Packed and Unpacked Products

The HELMS-INSPEKTOR

Sweets are luxury foodstuff and therefore high quality has to be especially maintained. This is confirmed by increasing quality regulations which are defined e.g. in the International Food Standard, in EU laws and in national food laws or by demanding product liabilities of companies. This affects the used raw materials as well as the unpacked products and the packaging, including the labels.

When confronted with increasing rates of production and often changing products image processing systems can make a significant contribution for being able to follow these increasing quality requirements. Even if camera inspection for the quality control of packaging is well established and has improved over the years, the efforts for reducing the rate of errors in the production process are a constant challenge for the development of more effective equipment and processes. An example for such a machine is the HELMS-INSPEKTOR (*).



Inspection of Products on a Conveyor Belt.

The HELMS-INSPEKTOR controls products, which are transported on a conveyor belt with high speed in respect of various error types. Typical errors in packaging are e.g. displaced print, welding errors, cracks and impurities or open and empty packaging. When dealing with unpacked products the detection of deviations in form, colour and size as well as the identification of foreign bodies and fragments plays a big role.

An example for an application is the implementation of the HELMS-INSPEKTOR at a noted manufacturer of flow pack packed chocolate bars (**). These emerge out of the packaging machine with a cadence of 800 units per minute. Especially when the machine starts and stops errors in packaging are caused, which accumulate to ca. 1 per mil of the total amount. The HELMS-INSPEKTOR assures that the inferior parts are identified and ejected.

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(**)Kägi Söhne AG, CH-9620 Lichtensteig

Strengths of the HELMS-INSPEKTOR

The Switch Box with DSP Computer

Quality Optimization

The high-resolution cameras and complete lighting and evaluation technology reliably identify even the smallest defects.

High Speed

Even with the basic fittings, the machine inspects up to 100 parts - and more! - every second. Easy scaling of the system hardware allows evaluation of the images from several cameras in parallel.

Easy Operation

A minimum of control elements combined with clear operating instructions on the display make the machine extremely easy to use.

Quick Product Changes

An almost countless number of product settings can be stored. The input of new products can be undertaken at the machine itself, or via a local network, or even via the Internet. Changing from one product to another then requires only two key-clicks, or can be undertaken fully automatically in less than a second.

Flexibility and a Modular Design

Thanks to its modular design, the machine can be optimally integrated in the working environment. This means that the distances between the ejection point, the switchbox and the inspection point can be chosen to match. It is possible to make use of various camera types and various ejection systems to best meet the task in hand.

Intelligent Software

The specially developed inspection software is capable of learning, i.e. the reference values and limit values improve independently in the course of the production. This also means that new types of errors not yet known at the time of installation of the machine can nevertheless be reliably detected.

Automatic Operating Documentation

All important activities and data can be steadily stored as log files, which means they are available for call-up per network at any time.

Robust "Closed" System

We make use of the most modern, high-performance industrial components. And thanks to the machine's closed - i.e. sealed - system, it is well protected from environmental influences, such as dust, heat, vapours or humidity.

Remote Diagnosis and Remote Maintenance

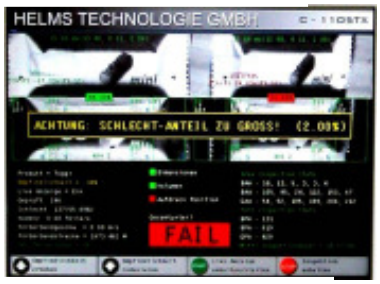
Machine maintenance can be carried out via the Internet. Learning to handle new products, or making minor adjustments, can therefore be undertaken by us from our own business premises without incurring high travelling expenses.

Functionality

The HELMS-INSPEKTOR is a new development of HELMS TECHNOLOGIE GMBH for the integrated quality control of food. The HELMS-INSPEKTOR optically inspects products on a conveyor belt and ejects defective products. This machine is applied for product and packaging inspection which includes product packaging, labels and unpacked products as well as raw materials.

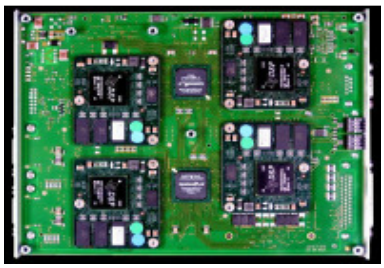
Example of a Camera

A camera, which is synchronized with the speed of the conveyor belt, takes a series of individual photos of each of the products transported on the conveyor. The number, resolution and types of area or line sensor cameras employed are not fixed and adapted to the respective task on hand. The special lighting technology with High Power LED's allows especially high definition colour photographs for assessment.



Operating Display

These are then pieced together to form a complex overall image and evaluated by a powerful digital signal processor (DSP), which controls the machine. At first the position of the product is checked and the brightness is corrected. Second, the visualized product characteristics in terms of form, colour, size and label are digitally compared with previously input specifications.



Board of the DSP Computer

If the product is in accordance with the parameters no action is deployed. If a discrepancy is found to exceed a previously set limit value, a fault is identified. The DSP computer removes the product from the conveyor belt via different technics e.g. blow-off valves.

The machine can process an unlimited amount of product settings. For each product configuration data has to be created and stored.

Maintenance per Web Interface

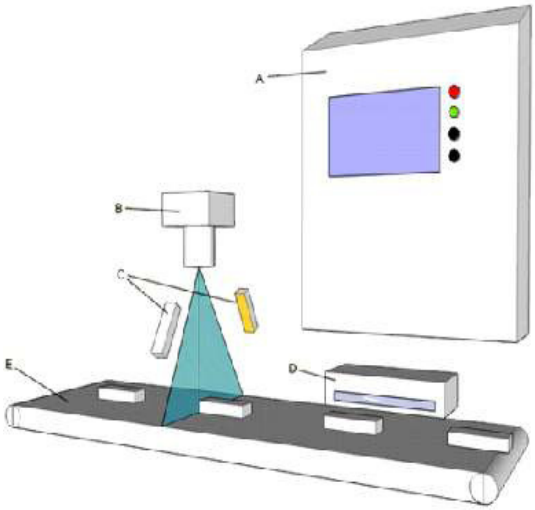
The handling of the machine processes (operating parameters, configuration and statistics) does not require direct access to the machine as the controlling computer has a network interface with integrated internet server. Via web interface the machine processes are controlled, maintenance is conducted and in terms of problems diagnostics are created or products are changed.

Assembly

A Switch Box
- Power Supply,
- Control Computer,
- Evaluation Electronics
- Display with Controls

B Take-Up Unit with Cameras
C Lighting Modules with High Power LED‘s
D Ejection Unit
- High-Pressure Air Jets
- Blow-Off Valves
- Foldable Belts
- Actuators

E Conveyor Belt with Speed Sensor



Applications

The HELMS-INSPEKTOR is applicable for the quality control of packaging, labels and barcodes as well as unpacked products and raw materials.

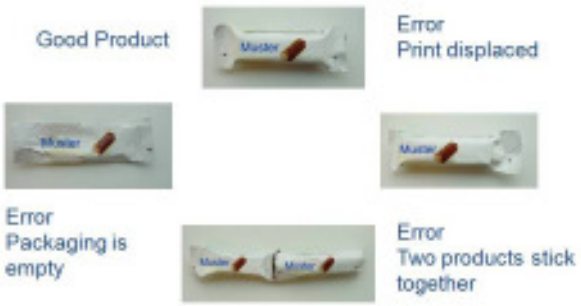
When dealing with packaging, the HELMS-INSPEKTOR checks various forms of packaging including bottles and tins. Here the completeness in respect of form, colour and size is checked. The machine recognizes for example welding errors, cracks and impurities as well as open and empty packaging.

When inspecting labels and barcodes, the HELMS-INSPEKTOR detects displaced print and checks simultaneously the print quality. In addition, he recognizes the use-by date as well as the batch and serial number. Moreover the machine is able to recognize and read labels, barcodes and 2D Codes.

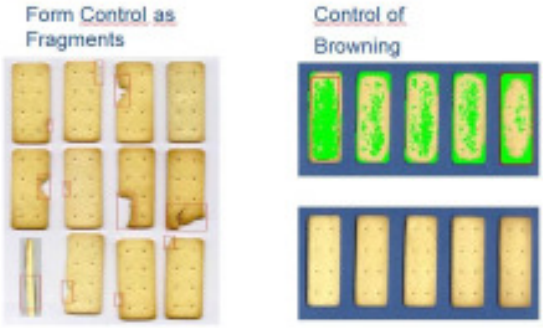
Additionally, the inspection of unpacked products and raw materials offers various applications. Above all the measuring of the size and the detection of form and colour deviations is important. Furthermore, foreign bodies, fragments and cracks are reliably identified.

Examples of Application

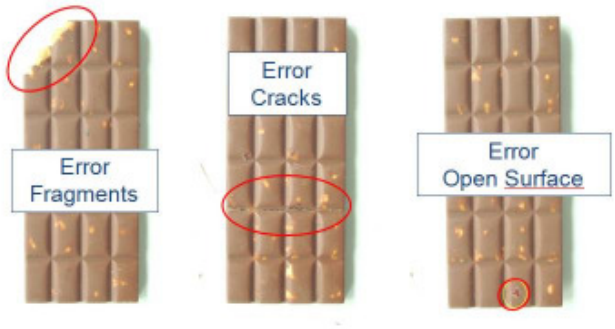
Example: Packaging Flow Pack



Example: Unpacked Products Biscuits



Example: Unpacked Products Chocolate



Example: Control of Raw Materials e.g. Hazelnuts