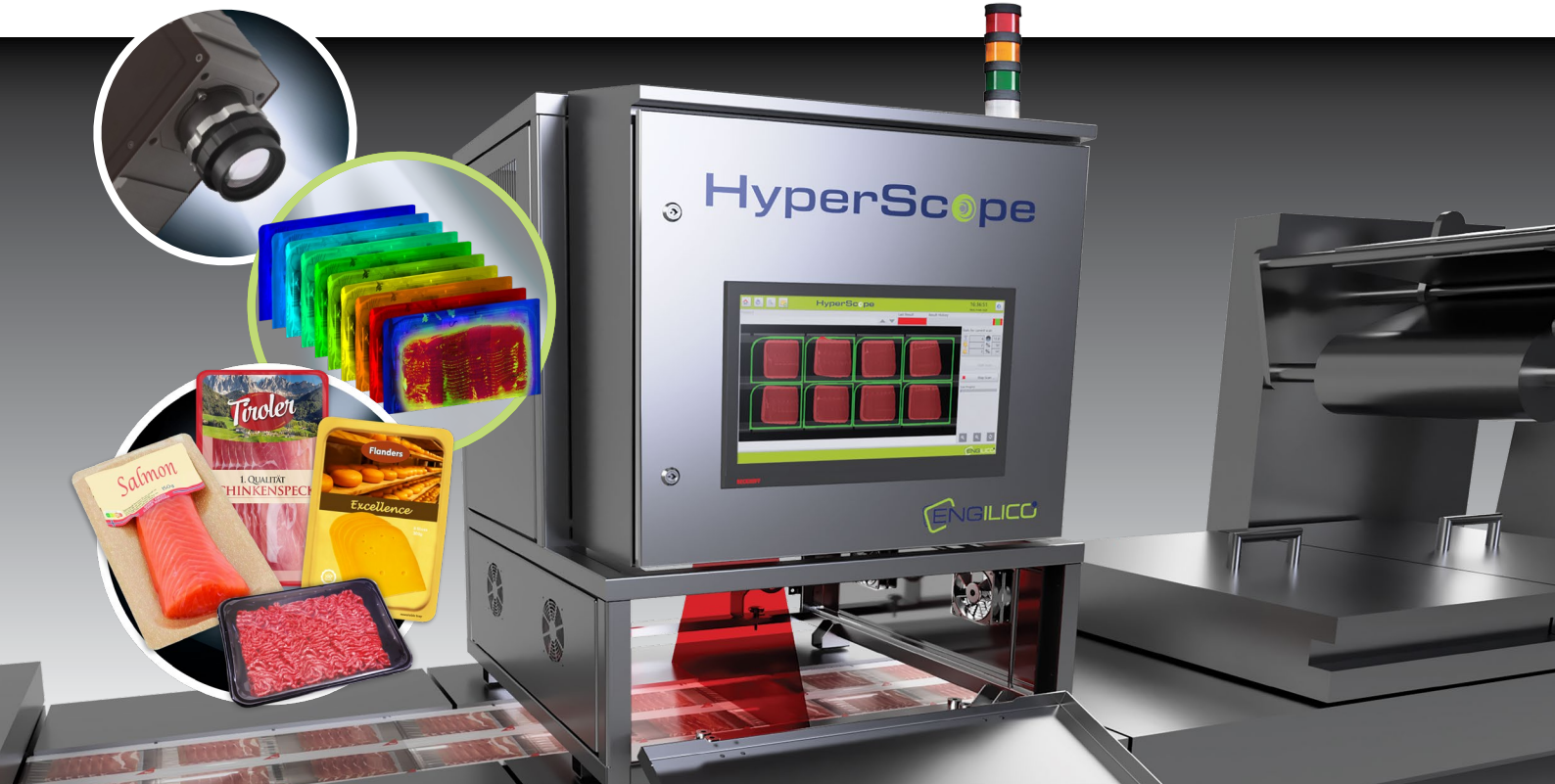


HyperScope

IN-MACHINE SEAL INSPECTION FOR THERMOFORM PACKAGING LINES



Contamination in the seal of rigid plastic packages causes important issues for food producers as it may lead to leakage and consequently reduced shelf life, health issues and even expensive recalls. As such automatic detection of contaminated seals is important for both food safety and packaging production automation. Engilico, specialist in in-line seal inspection for flexible and rigid packaging, introduces an in-machine HyperScope version for plastic or paper-based thermoforms sealed with plastic, that is mounted above the packaging line.

The **HyperScope®** solution is based on hyperspectral imaging (HSI). This technology enables to obtain images with much higher contrast than traditional vision systems and can even detect contamination through printed films. The inspection system features GPU-accelerated artificial intelligence, which enables high-precision seal area detection in real-time. Typical applications are the in-line or in-machine seal inspection of thermoformed packages with meat, cheese, seafood and vegetables.

In-machine, 100% seal inspection

The hyperspectral system is installed above the - eventually multi-array packaging line. This inspection method offers many advantages

such as no need for expensive extra space in the packaging line, no need for extra conveyors and detection of defective packages, immediately after sealing, when packages are still ideally shaped and positioned. Every array of packages is inspected and the system issues a signal to an ejector to reject packages with seal issues.

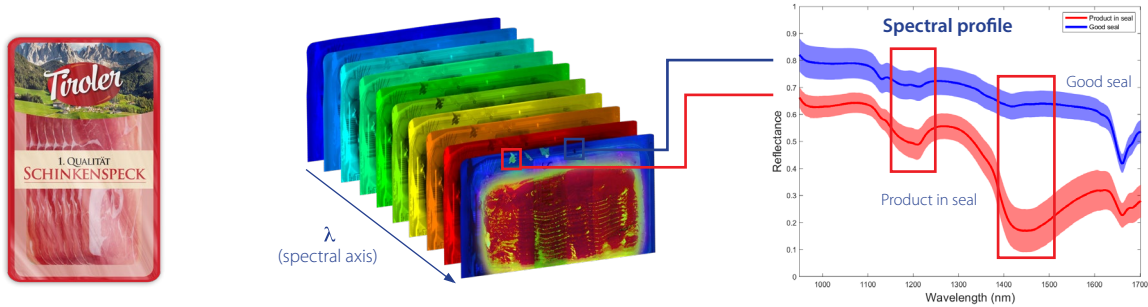
The "core" of the **HyperScope®** system is the software controller that uses artificial intelligence to instantly to analyze the seal quality. All information is displayed in an operator-friendly user interface to provide feedback on every package. All production related data, such as product type, number of good/bad packages, date, time is saved to monitor the production quality.

Benefits & Features

- In-machine seal inspection for automated environments
- Installation on top of thermoform packaging machine saves production line space
- Real-time, high-precision seal inspection of multi-array packages
- Inspection after sealing, before packages are separated
- Ideal for plastic (coloured) thermoforms, but also for cardboard trays & backing material
- Detects contamination through printed top film, invisible for standard vision cameras

Hyperspectral technology

- **HyperScope®** provides a spectral profile over a broad wavelength range: depending on the camera type, ranging from visual (400 nm) over near-infrared (950 nm) to shortwave near-infrared light (1700 nm)
- The spectral profile from the package is built from the reflecting light containing information on the materials in the package and in the sealing area
- Near-infrared light with longer wavelengths is transmitted and reflected through the top film, even when printed
- Substances such as plastics, organic products, fat, liquids can be identified in different wavelength bands



A standard industrial camera image is built from 3 wavelengths ranges (RGB) and only provides visible information

The hyperspectral 3D spectral image map is built from a broad wavelength spectrum. Every pixel is analyzed individually and differences in materials or composition are detected, even through printed foil. A contaminated seal has a different spectral profile than the profile of a clean seal.

Seal inspection examples

				<ul style="list-style-type: none"> ■ Plastic ■ Meat ■ Fat
<p>Visual image When product and film have similar colors (yellow-on-yellow), contamination in the seal is hardly visible.</p>	<p>Hyperspectral image The higher contrast clearly reveals contamination (red) in the seal (green).</p>	<p>Visual image with detail of contamination With similar (e.g. red-on-red) or transparent colours, the contamination (e.g. fat, meat) is not visible.</p>	<p>Hyperspectral classification The image with higher contrast allows to detect different substances, even through printed film.</p>	

Applications

Seal inspection of plastic and/or cardboard thermo-formed packages sealed with plastic or thin paper film.

- Cheese
- Fillets
- Sliced meat
- Minced meat
- Ready-meals
- Fresh produce
- Snacks
- Dairy

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