# HyperScope

## MAKING THE INVISIBLE VISIBLE

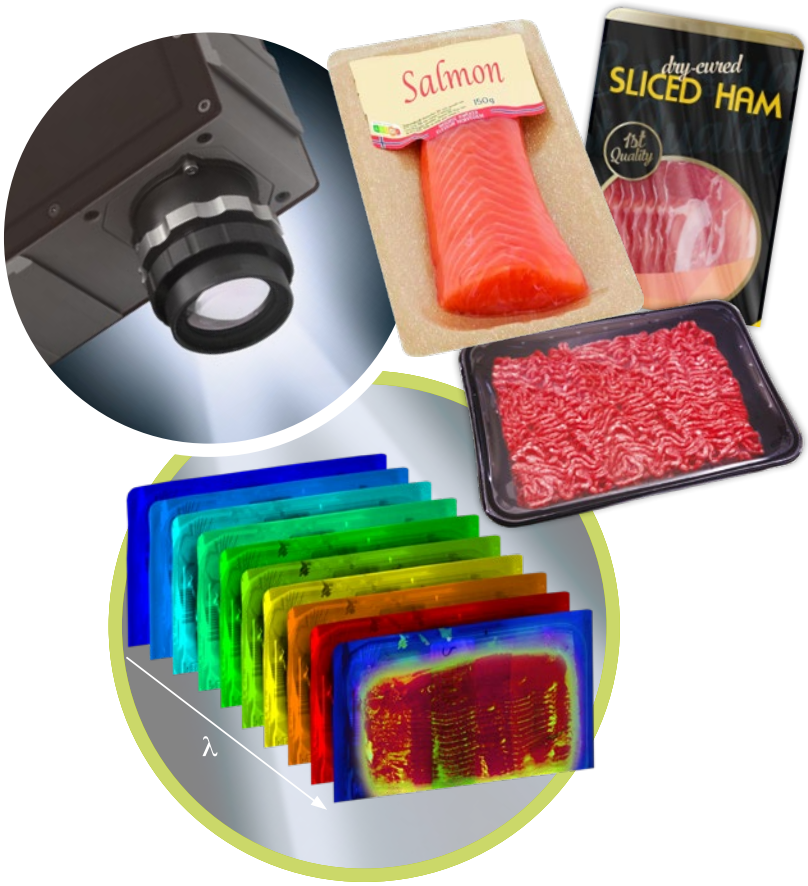

## Hyperspectral seal inspection of plastic and paper-based rigid packaging

ENGILICO™

# HyperScope

## 100% IN-LINE HYPERSPECTRAL SEAL INSPECTION FOR TRAYS, POTS AND THERMOFORMS

**Seal contamination in food packages leads to leakage, growth of molds or bacteria and consequently reduced shelf-life, health risks and even expensive recalls. Automatic detection of contaminated seals is essential for both food safety and production automation.**




***Hyper****Scope*™ is a new in-line seal inspection system that detects foreign materials or contamination in the sealing area that may lead to leaking packages.

Hyperspectral camera technology enables to identify substances with different compositions such as plastics, paper, organic products, fat, liquids with a much higher contrast than traditional vision-based camera systems. In addition, when printed film is used, hyperspectral is the only imaging technology that detects contamination through the sealing film reliably.

## Benefits

- 100% Non-destructive inspection
- Improves outgoing packaging quality
- Eliminates manual inspection
- Enables end-of-line automation
- Reduces product returns & scrap

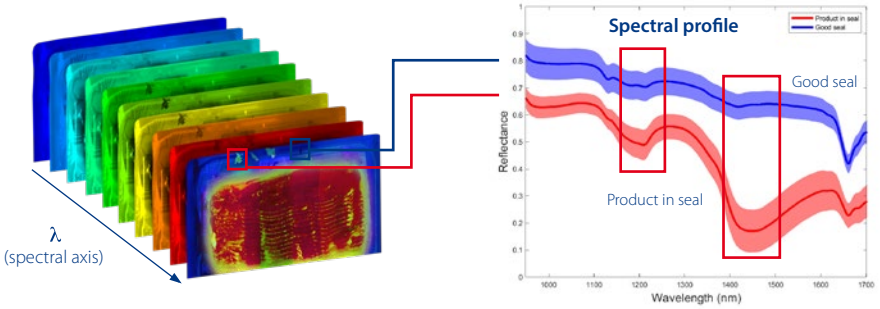
## Features

- Ideal for plastic trays and thermoforms, but also for cardboard trays & backing material or formable paper
- Detects contamination through printed top film, invisible for standard vision cameras
- Real-time, high-precision seal inspection using GPU-accelerated artificial intelligence
- Fast inspection up to 160 ppm
- Easy installation over existing or newly supplied conveyor

# How it works

- ***Hyper****Scope*™ 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 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*

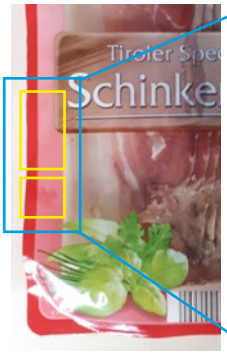


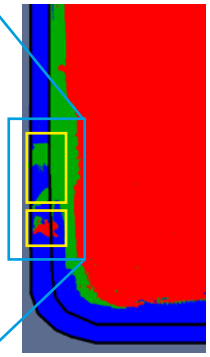

*The hyperspectral 3D spectral image map is built from a broad wavelength spectrum. Every pixel is analyzed individually and differences in materials or composition are detected, even through printed foil. A contaminated seal has a different spectral profile than the profile of a clean seal.*

# Seal inspection examples


**Visual image**
*When product and film have similar colors (yellow-on-yellow), contamination in the seal is hardly visible.*


**Hyperspectral image**
*The higher contrast clearly reveals contamination (red) in the seal (green).*






**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.*

**Hyperspectral classification**
*The image with higher contrast allows to detect different substances, even through printed film.*

# Applications

Seal inspection of plastic and/or cardboard trays, pots and thermoformed packages sealed with thin plastic or paper film.

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



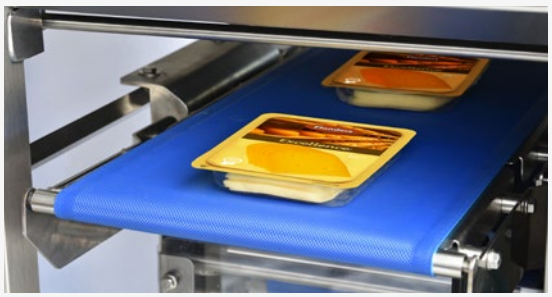
## System

***Hyper****Scope*™ consists of a hyperspectral camera, dedicated lighting and a controller unit with proprietary software.

The inspection system features **GPU-accelerated artificial intelligence,** which enables high-precision seal area detection in real-time, regardless of the package orientation, packaging material, layout or size.

The system is installed over an existing or its own[1] conveyor belt and inspects every individual package. Two system sizes are available to suit different sizes of conveyor belts.

Results are analyzed in real-time and immediate feedback on the sealing quality is displayed on the controller touch screen. A reject signal is sent to an (optional) ejector[1] to eliminate defective packages.




## Specifications

| HyperScope model | NIR 400 | NIR 600 | VNIR 400 | VNIR 600 |
|---|---|---|---|---|
| Wavelength range | 950 - 1700 nm | | 400 - 1000 nm | |
| Sensor type | InGaAs | | CMOS | |
| Scan speed [2] | 400 - 2000 lines/sec | | | |
| Tray inspection speed [2] | 160 packages/minute | | | |
| Use case | Printed and transparent seal | | Transparent seal | |
| Max. width conveyor band | 400 mm total<br>300 mm belt | 700 mm total<br>600 mm belt | 400 mm total<br>300 mm belt | 700 mm total<br>600 mm belt |

[1] Optional devices
[2] Typical speeds: actual values depend on the specific application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