

Konica Minolta Day

Hyperspectral Imaging

Toward Solving Material Issues

March 15, 2023



Tapio Kallonen, CEO





**SPECIM
IMPACT TO
THE WORLD**

SPECIM TODAY

 **HEAD OFFICE**
OULU, FINLAND

FOUNDED IN **1995**

> 9 000
SPECTROGRAPHS
+
SPECTRAL CAMERAS
DELIVERED



PERSONNEL CIRCA **90**

>20% CAGR IN INDUSTRIAL SEGMENT

PART OF
KONICA MINOLTA
SINCE 2020



SPECIM LOCATIONS
BARCELONA, MUNICH,
NEW JERSEY, SHANGHAI
+ WORLDWIDE DISTRIBUTOR NETWORK

OUR VISION : SPECTRAL IMAGING MADE EASY

MACRO TRENDS

- Environmental
- Automation
- Health and Life
- Circular Economy

OUR MISSION
Create new value for customers and society

HIGHER LEVELS OF AUTOMATION

GROWTH DRIVERS

IMPORTANCE OF ENSURING QUALITY AND SAFETY

GROWING DEMAND FOR DETAILED INFORMATION

Improving fulfillment in work and corporate dynamism



Addressing climate change



Using limited resources effectively



POSITIONING WITHIN THE KONICA MINOLTA SENSING BUSINESS

Industry

Sensing	Materials and Components	Imaging-IoT Solutions
<ul style="list-style-type: none"> ■ Measuring Instruments 	<ul style="list-style-type: none"> ■ Performance Materials ■ Optical Components ■ IJ (inkjet) Components 	

Specim, Spectral Imaging
*2020



Radiant Vision Systems
*2015



Instrument Systems
*2012



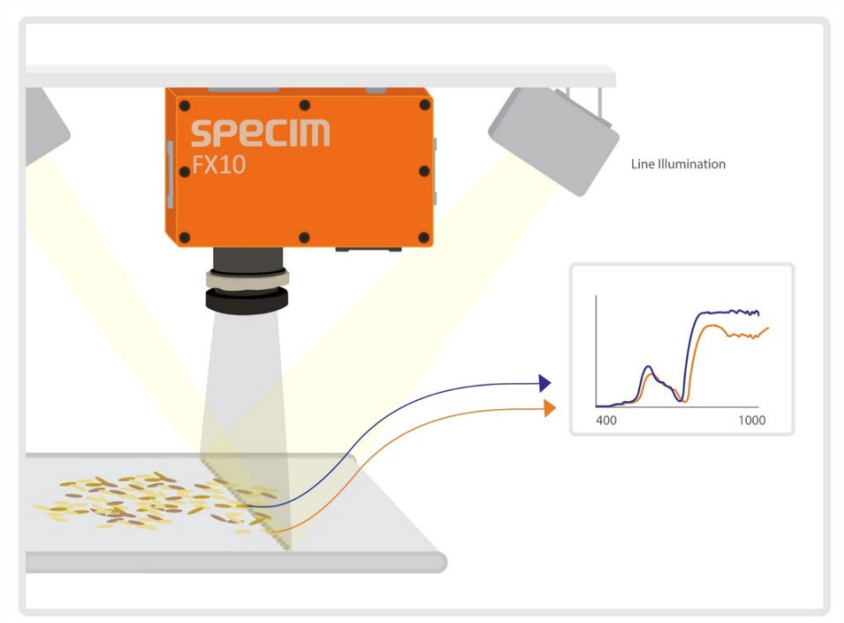
Eines Vision Systems
*2019



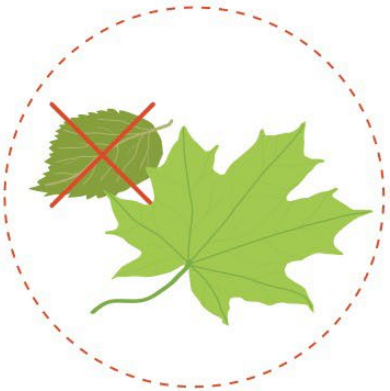
Konica Minolta



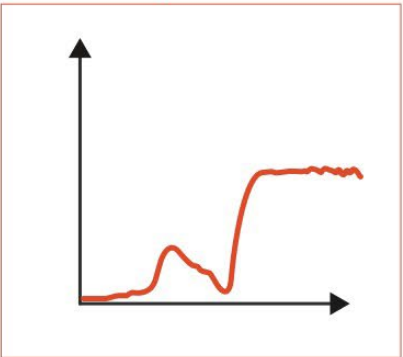
WHAT IS HYPERSPECTRAL IMAGING?



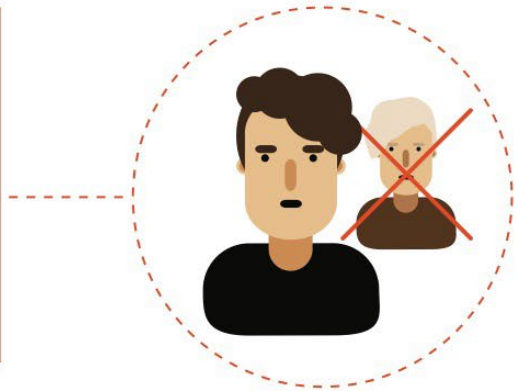
Classify different materials based on their *unique spectral signature*.



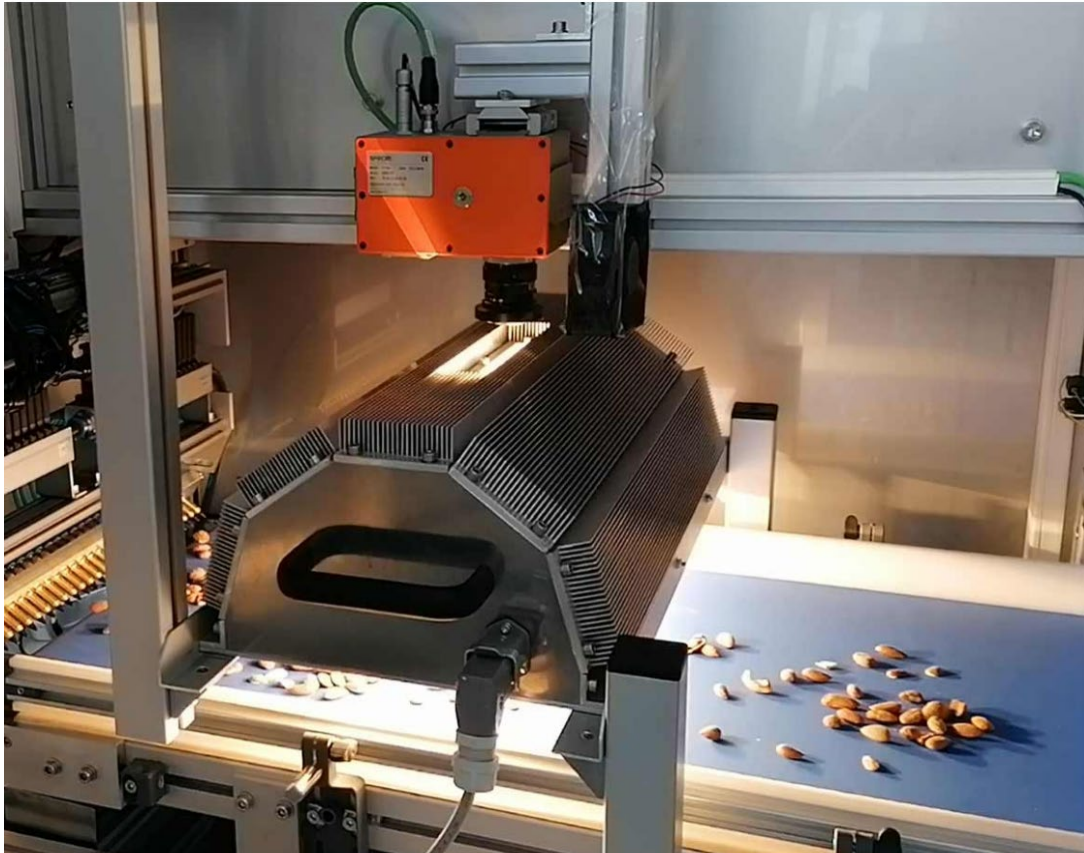
Spectrum



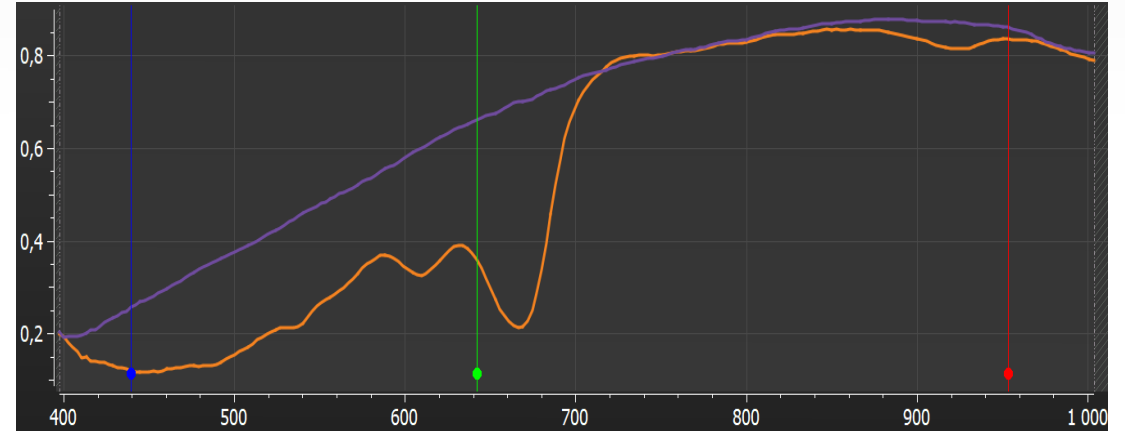
Fingerprint



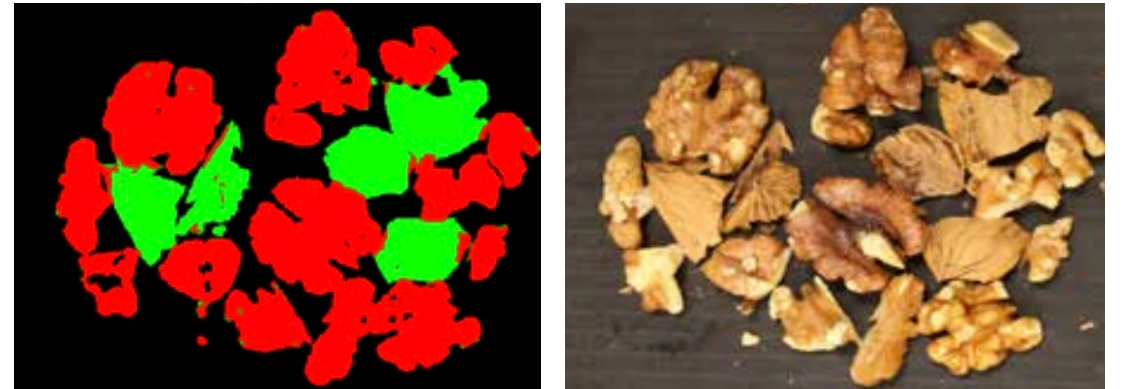
WHAT IS HYPERSPECTRAL IMAGING?



Specim HSI system obtains chemical information across the full product stream in real-time with a single scan.



The unique spectral signature of nuts vs. shells captured with the HSI camera.



Hyperspectral vs. RGB image of nuts and shells.

CHRONOLOGY



Building on the early leadership on research, Specim is increasingly focusing on ready-to-deploy integrated solutions for the growing industrial market.



Industrial platform solutions



Application specific solutions



Spectral cameras



Spectrographs

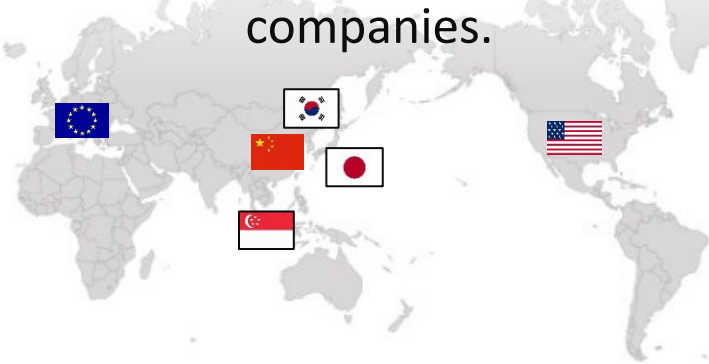
1995

2023

SYNERGIES AS A KONICA MINOLTA GROUP

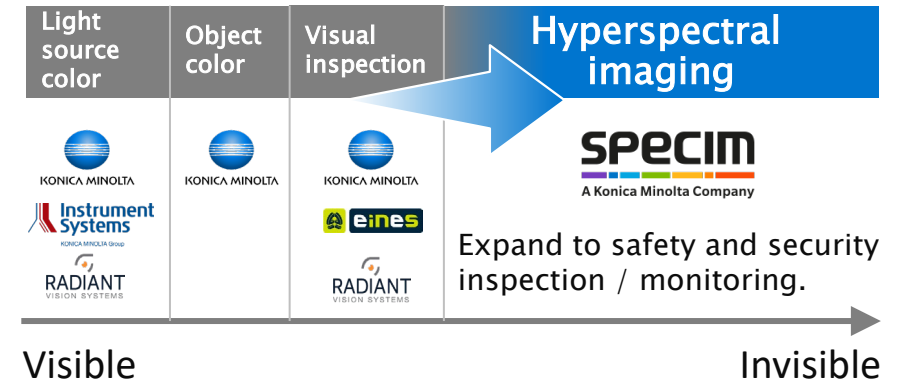
GEOGRAPHIC COVERAGE EXPANSION

Cooperation with Konica Minolta sales companies.



TECHNOLOGY EXPANSION

See beyond the human eye.



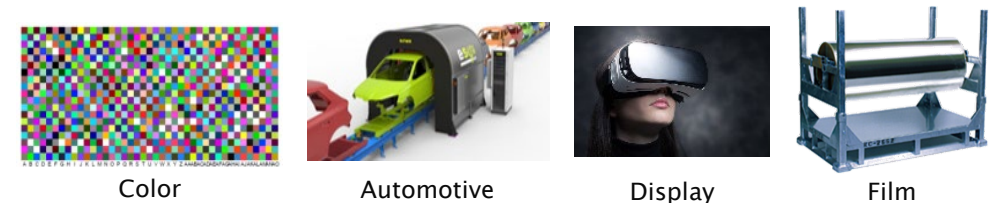
TARGET CUSTOMER SEGMENT EXPANSION

Offer new value to Konica Minolta's customer base, especially to brand owners.



CUSTOMER VALUE EXPANSION

Create new value with Konica Minolta's group companies.



COMPETITIVE LANDSCAPE IN RELATION TO THE MAIN COMPETITORS



TARGET MARKET

Specim has been outperforming the market growth. Our industrial platform, SpecimONE, allows us to grasp new opportunities in the growing HSI system market.

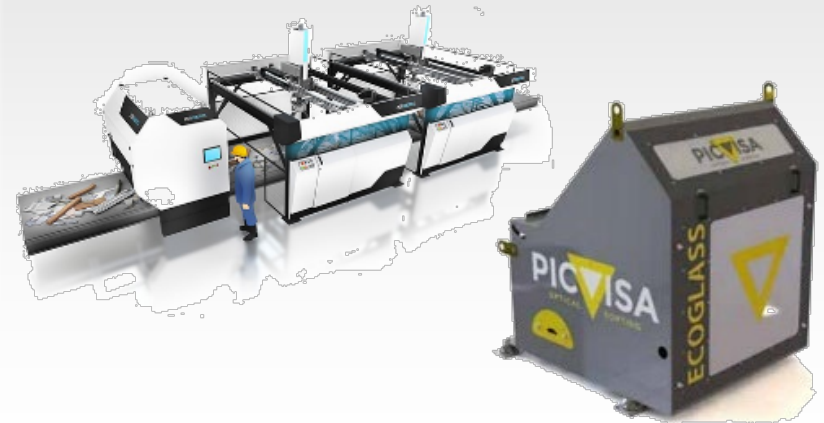
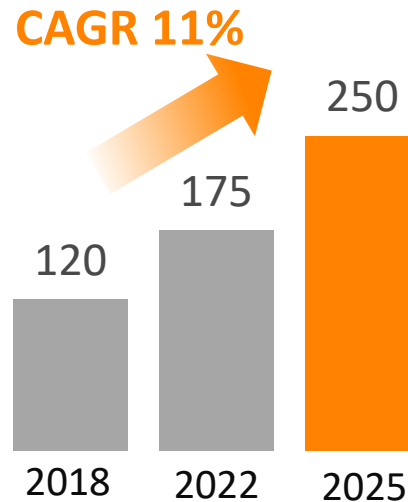


HSI System market

- Market size : 900M USD / 2025
- Players: Integrators, Machine builders, Brand owners, Service providers

HSI Camera market

- Market size: 250M USD /2025
- CAGR 11%
- Players: Camera manufacturers





WASTE SORTING



FOOD QUALITY CONTROL



FOOD SORTING



MATERIAL RECYCLING

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ENVIRONMENT MONITORING



HEALTHCARE & PHARMA



MINERAL EXPLORATION



AGRICULTURE & VEGETATION



PLASTICS

Global plastic waste generation more than doubled from 2000 to 2019.

Globally, only 9% of plastic waste is recycled while 22% is mismanaged and 50% ends up in landfill.

Source: OECD

TEXTILES

The apparel and footwear industries account for 8% of the world's greenhouse gas emissions.

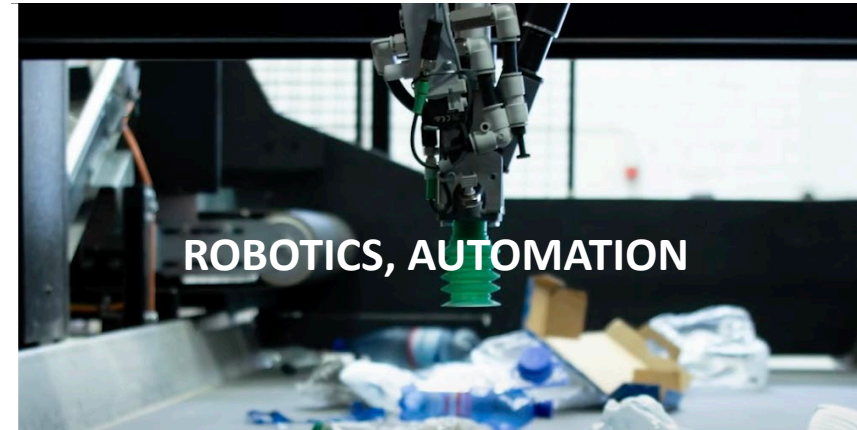
Globally, less than 1% textile waste is recycled while roughly 73% is landfilled.

Source: OECD

RECYCLING & WASTE MANAGEMENT

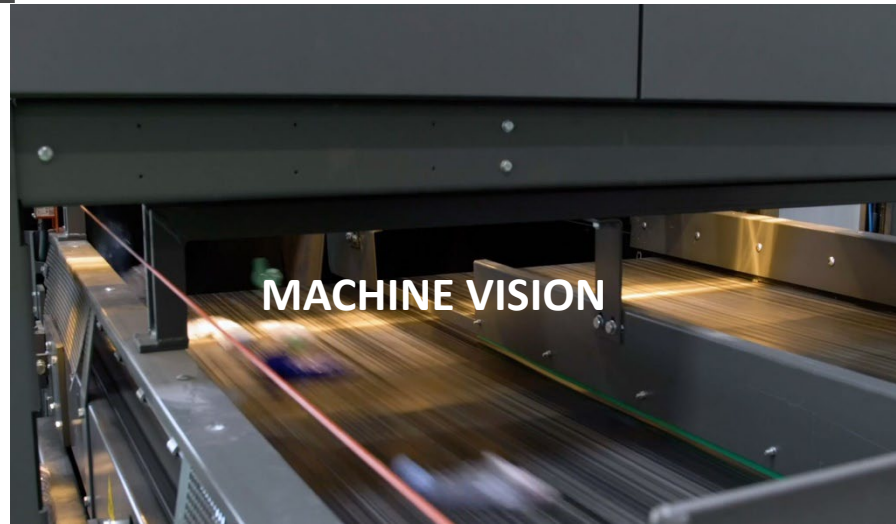


- ✓ Near 100% purity and higher value of recycled fragments



Solutions

- ✓ Plastics sorting
- ✓ Textile recycling
- ✓ Construction waste
- ✓ Household waste
- ✓ etc.



Needs

- ✓ Automate waste sorting
- ✓ Improve quality and efficiency
- ✓ Turn waste into reusable material
- ✓ Reduce health and safety risks



<https://www.specim.com/case-study-picvisa-machine-vision-solutions-for-waste-treatment-recycling/>

SPECIM FX50



The Specim FX50 is the only HSI camera on the market required in black plastics sorting.

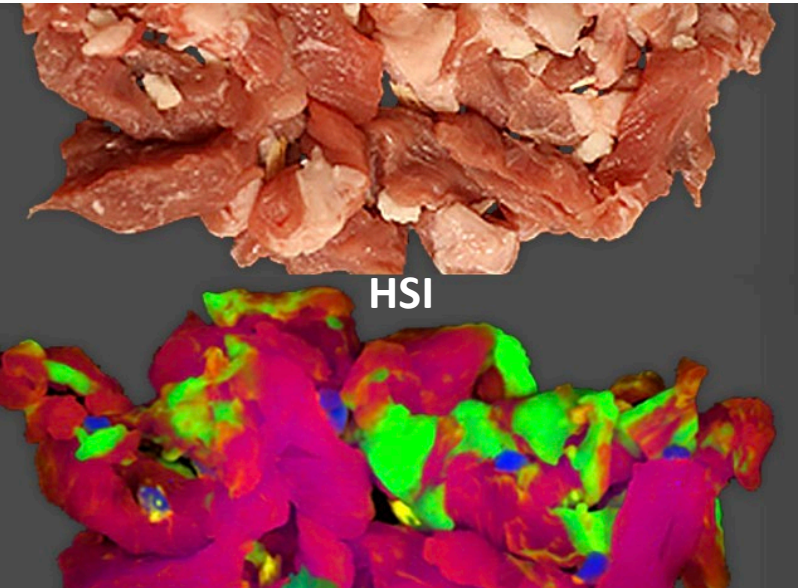


FOOD

Globally of food produced for human consumption, **1/3 is lost or wasted.** If wasted food were a country, it would be the **third-largest producer of carbon dioxide** in the world.

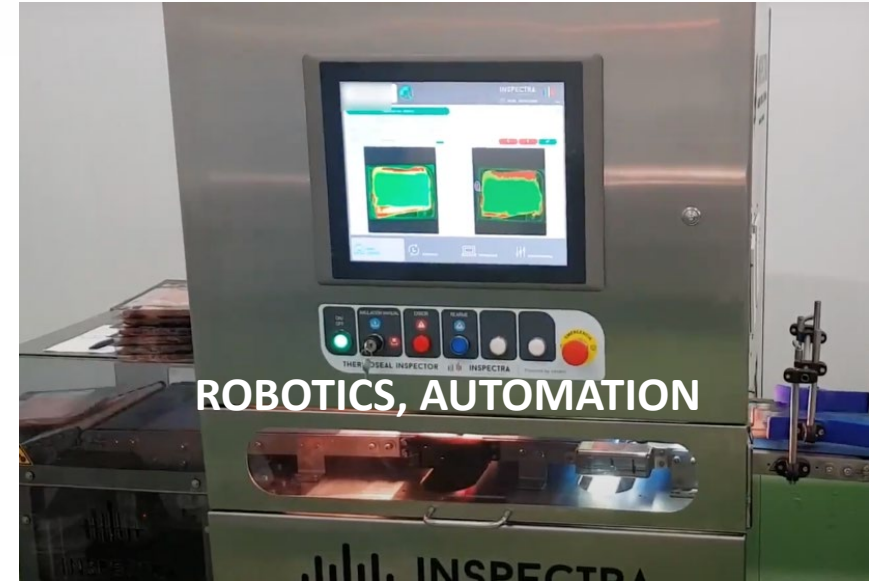
Source: WPF

FOOD SORTING AND QUALITY CONTROL

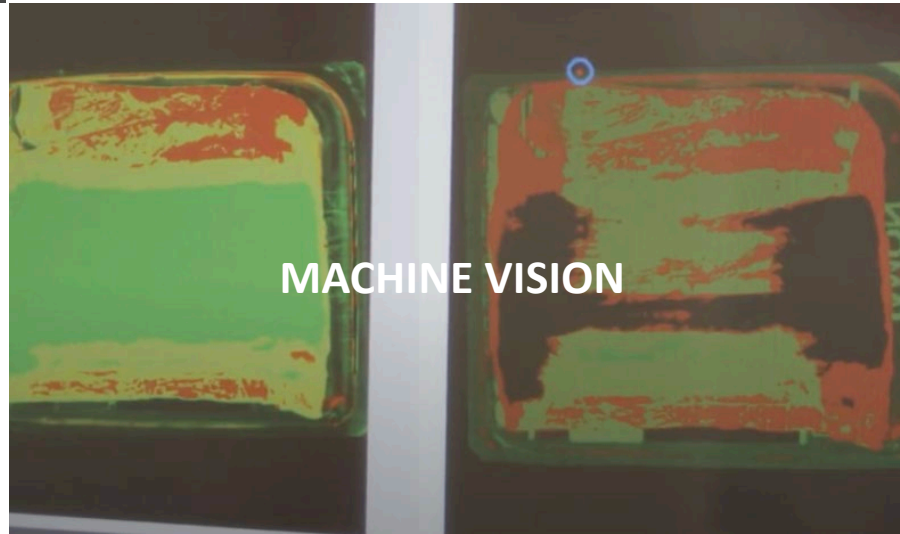


“Integrating hyperspectral solution to machine vision equipment, we automate the work of three people.”

Emilio J. de la Red,
Head of Innovation, INNDEO

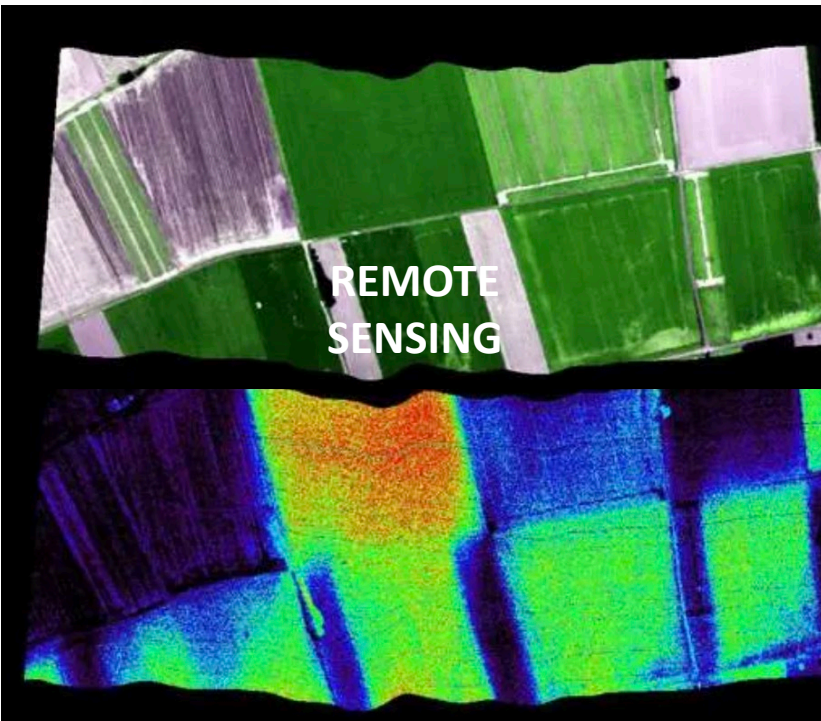


- ✓ Food sorting and quality control
- ✓ Foreign object detection
- ✓ Food grading
- ✓ Substance analysis
- ✓ Packaging inspection



- ✓ Automate workflows
- ✓ Increase food safety
- ✓ Reduce food waste
- ✓ Avoid recalls
- ✓ Improve production efficiency

ENVIRONMENT, GEOLOGY & MINERALS



- ✓ Predict, monitor, assess, and aftercare for ecological catastrophes

- ✓ Improve yield quality
- ✓ Detect plant diseases
- ✓ Reduce waste, energy, and water consumption
- ✓ Estimate and quantify yield growth


















- ✓ Efficient exploration and use of minerals
- ✓ Rapid and reliable mineral analysis of geological samples

SPECIM



A Konica Minolta Company

PRODUCT RANGE

	VNIR 400 – 1 000 nm	NIR/SWIR 900 – 2 500 nm	MWIR 3 000 – 5 000 nm	LWIR 8 000 – 12 500 nm
TYPICAL APPLICATIONS	Colour, Fruit & Veg, Skin & Tissue, Plants, Film, Water	Sorting, Recycling, Chemical Waste, Pharma, Quality	Black Plastic, Surfaces, Minerals, Detection	Mining, Detection, Gas, Geothermal
IQ SERIES	SPECIM IQ 			
FX SERIES	FX10 	FX17 	FX50 	
AFX SERIES	AFX10 	AFX17 		
SISU SERIES	SisuCHEMA  SisuROCK  SisuSCS 			
SPECTRAL CAMERAS	PFD4K-65-V10E  sCMOS-50-V10E  FENIX 	SWIR 		OWL  LWIR-HS 

SOFTWARE



SpecimINSIGHT

- Off-line tool to browse and explore data, create and validate classification models.
- Part of the SpecimONE spectral imaging platform.



Specim IQ Studio

- Remote control the Specim IQ camera and handle the Specim IQ data.
- Process the hyperspectral data and create applications for the Specim IQ.



Lumo family

Selection of data acquisition software tools for Specim cameras, scanners and airborne systems.



CaliGeoPRO

Data processing tool to radiometrically correct and georeference hyperspectral data acquired with Specim AISA and AFX series sensors.

GLOSSARY

HSI Hyperspectral Imaging

A spectrograph is an instrument that separates incoming light by its wavelength or frequency and records the resulting spectrum in some kind of multichannel detector, like a photographic plate.