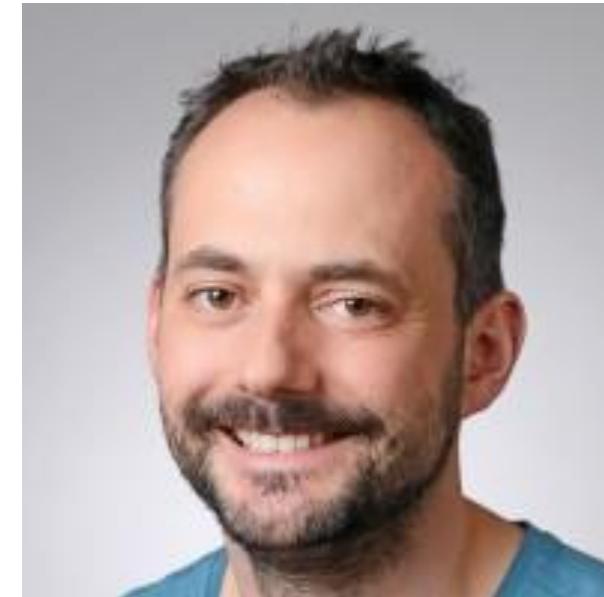


DISCOVER THE POWER OF
NIR HYPERSPECTRAL
IMAGING



WELCOME

Mathieu Marmion PhD
Lead Application Specialist, Specim



AGENDA

- Specim company introduction
- What is NIR hyperspectral imaging?
- Applications that benefit from NIR
- Specim's offering for NIR
- Illumination requirements for NIR HSI
- Q&A



SPECIM TODAY

FOUNDED IN

1995

+10 000

SPECTROGRAPHS

+

SPECTRAL CAMERAS

DELIVERED



PERSONNEL CIRCA

90

>20% CAGR

IN INDUSTRIAL SEGMENT

PART OF

KONICA MINOLTA

SINCE 2020



HEAD OFFICE
OULU, FINLAND



SPECIM LOCATIONS

BARCELONA, MUNICH, NEW JERSEY, SHANGHAI

+ WORLDWIDE DISTRIBUTOR NETWORK



WHAT IS NIR HYPERSPECTRAL IMAGING?

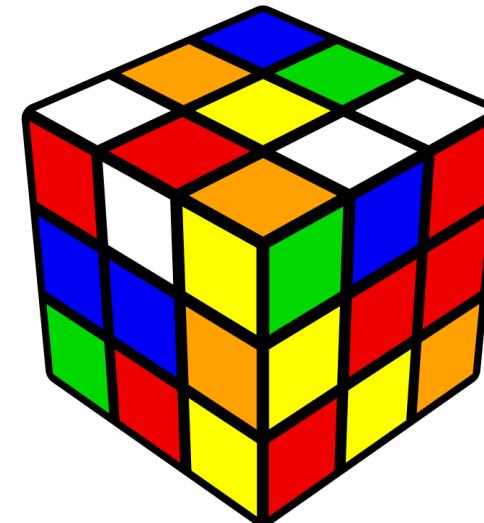
WHAT IS HYPERSPECTRAL IMAGING?

A COMBINATION OF
SPATIAL AND SPECTRAL INFORMATION

SPECTRAL INFORMATION

- Qualitative analysis (classification)
- Quantitative analysis
- Colour coordinate calculation

IDENTIFICATION & CLASSIFICATION

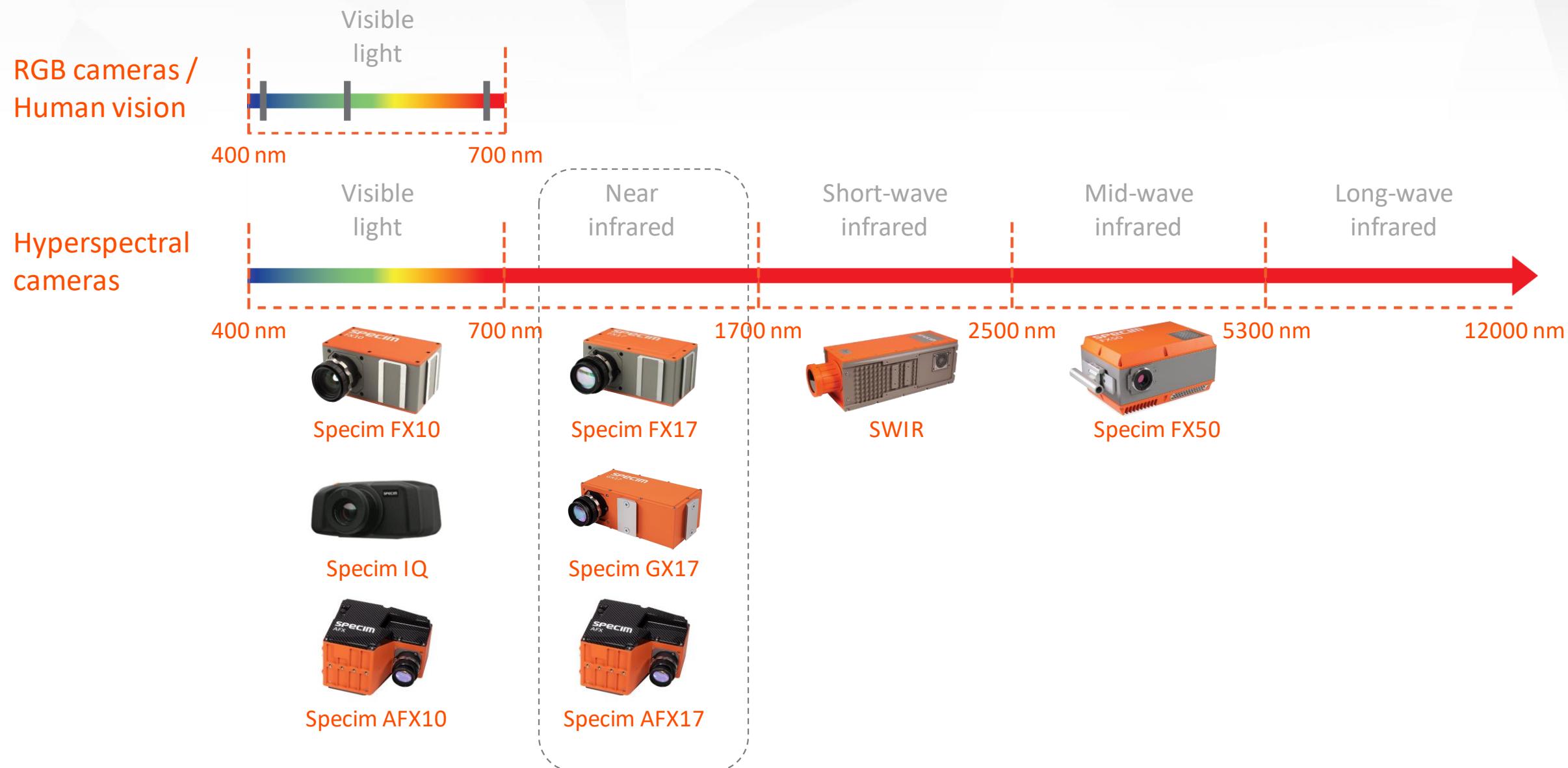


SPATIAL INFORMATION

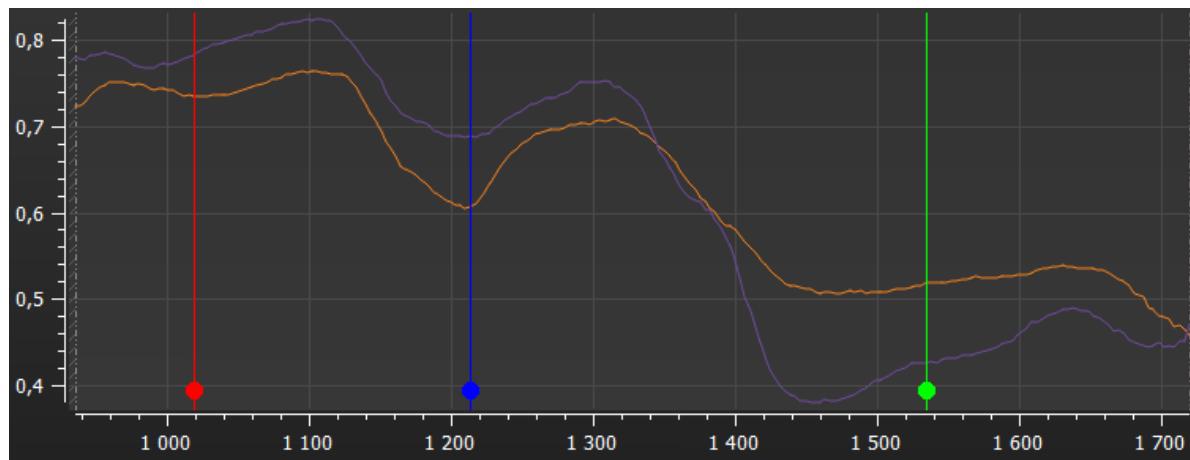
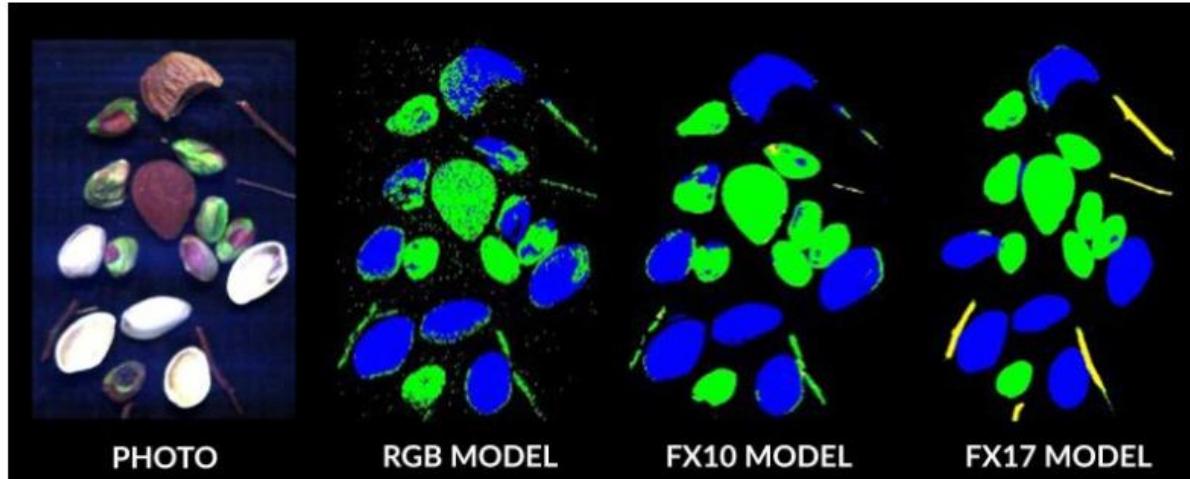
- Size and shape analysis
- Distribution analysis
- Statistics

DISTRIBUTION & AREAL SEPARATION

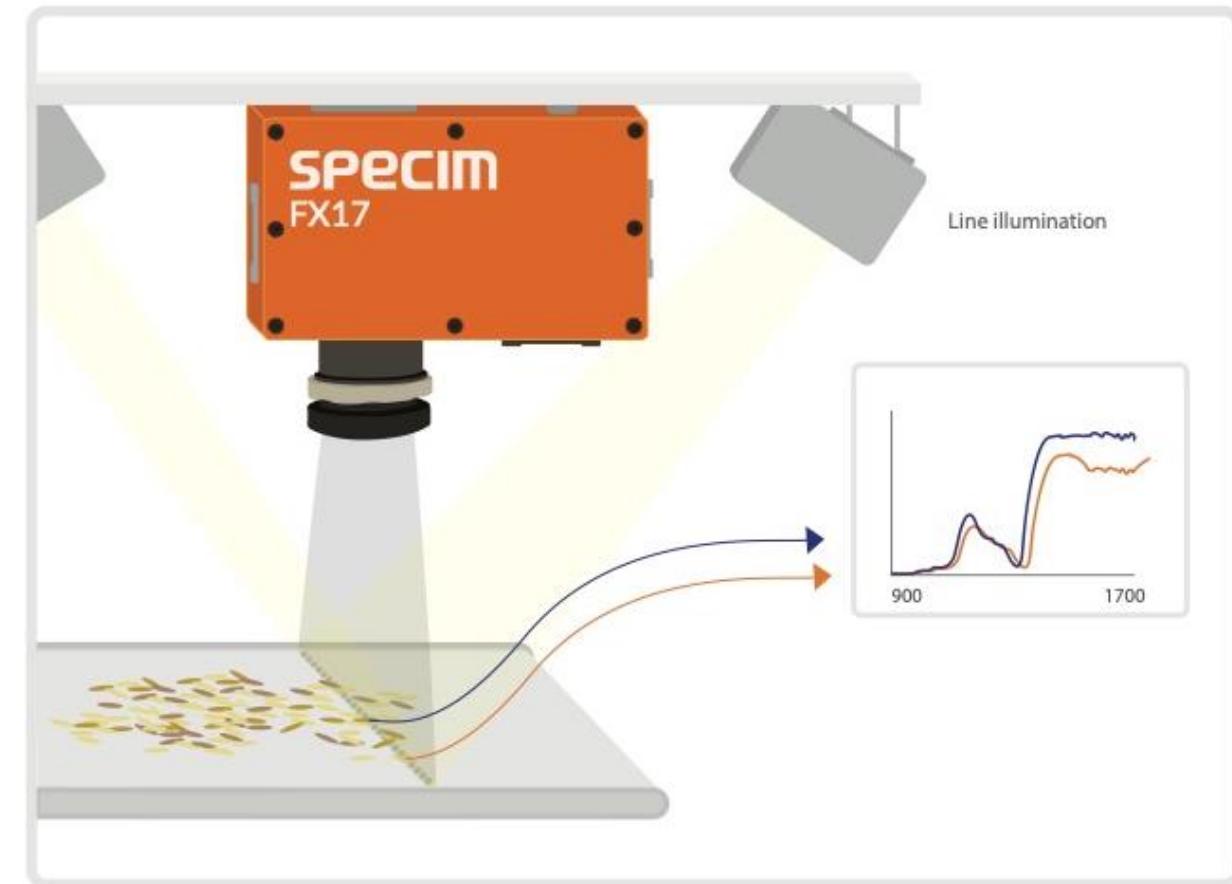
WHAT IS NIR HYPERSPECTRAL IMAGING?



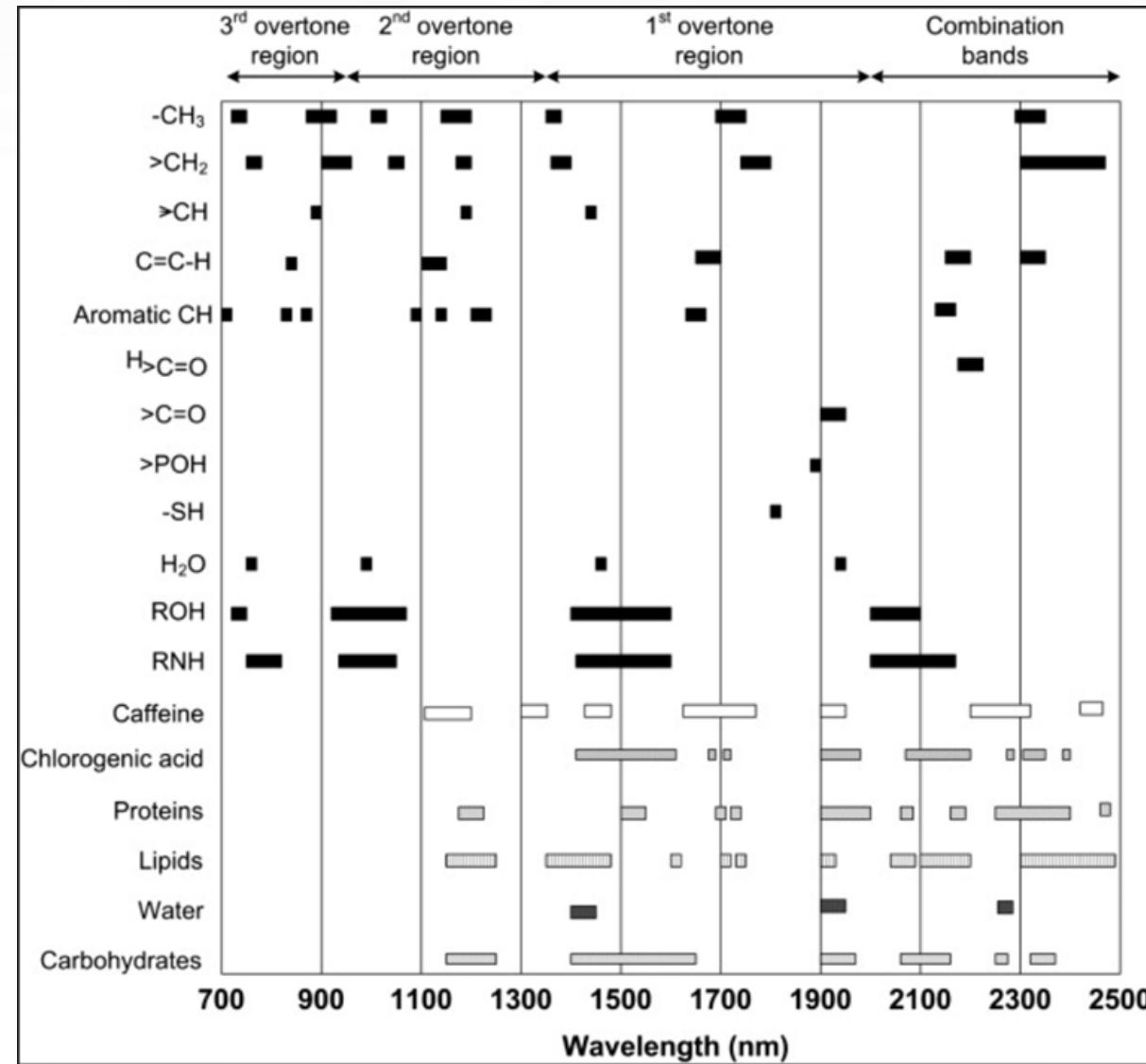
WHAT IS NIR HYPERSPECTRAL IMAGING?



NIR spectrum: Almond, Shell



OVERTONES

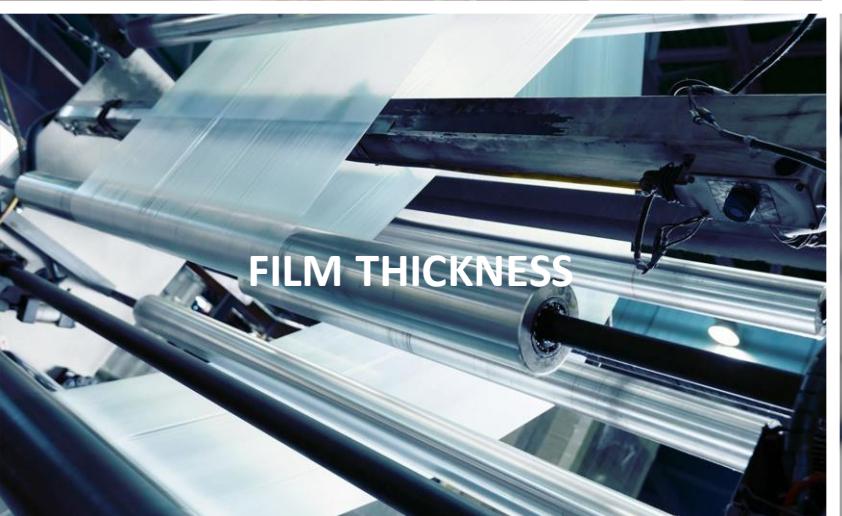




APPLICATIONS THAT BENEFIT FROM NIR



SPECIM
A Konica Minolta Company

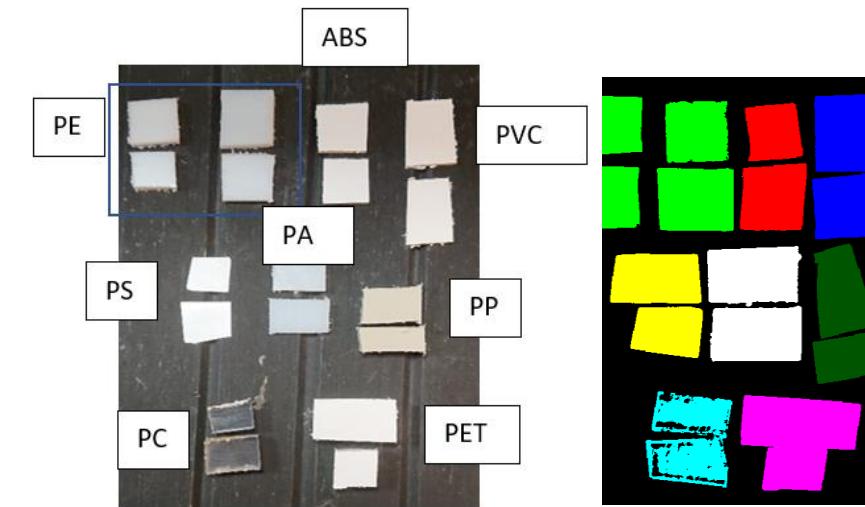


NEW APPLICATIONS?

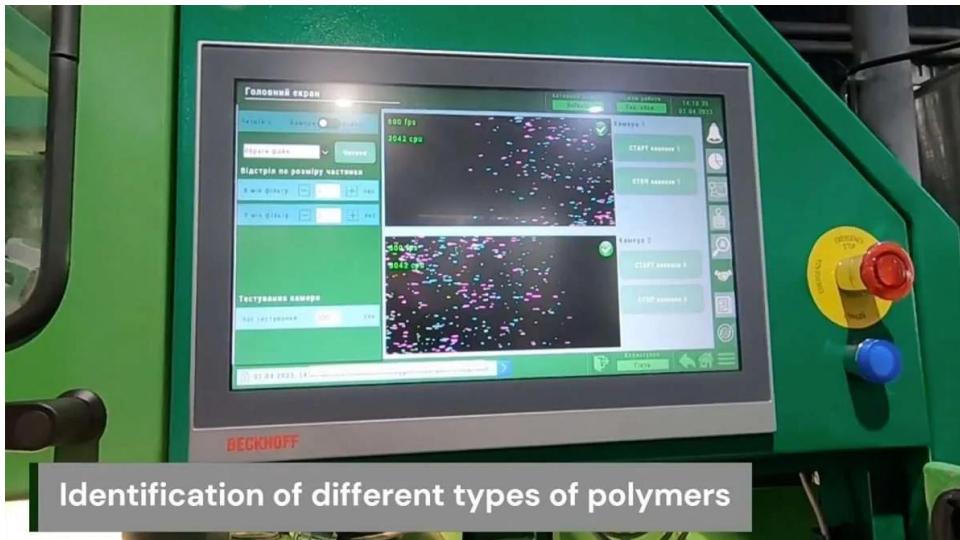
PLASTICS RECYCLING WITH HSI



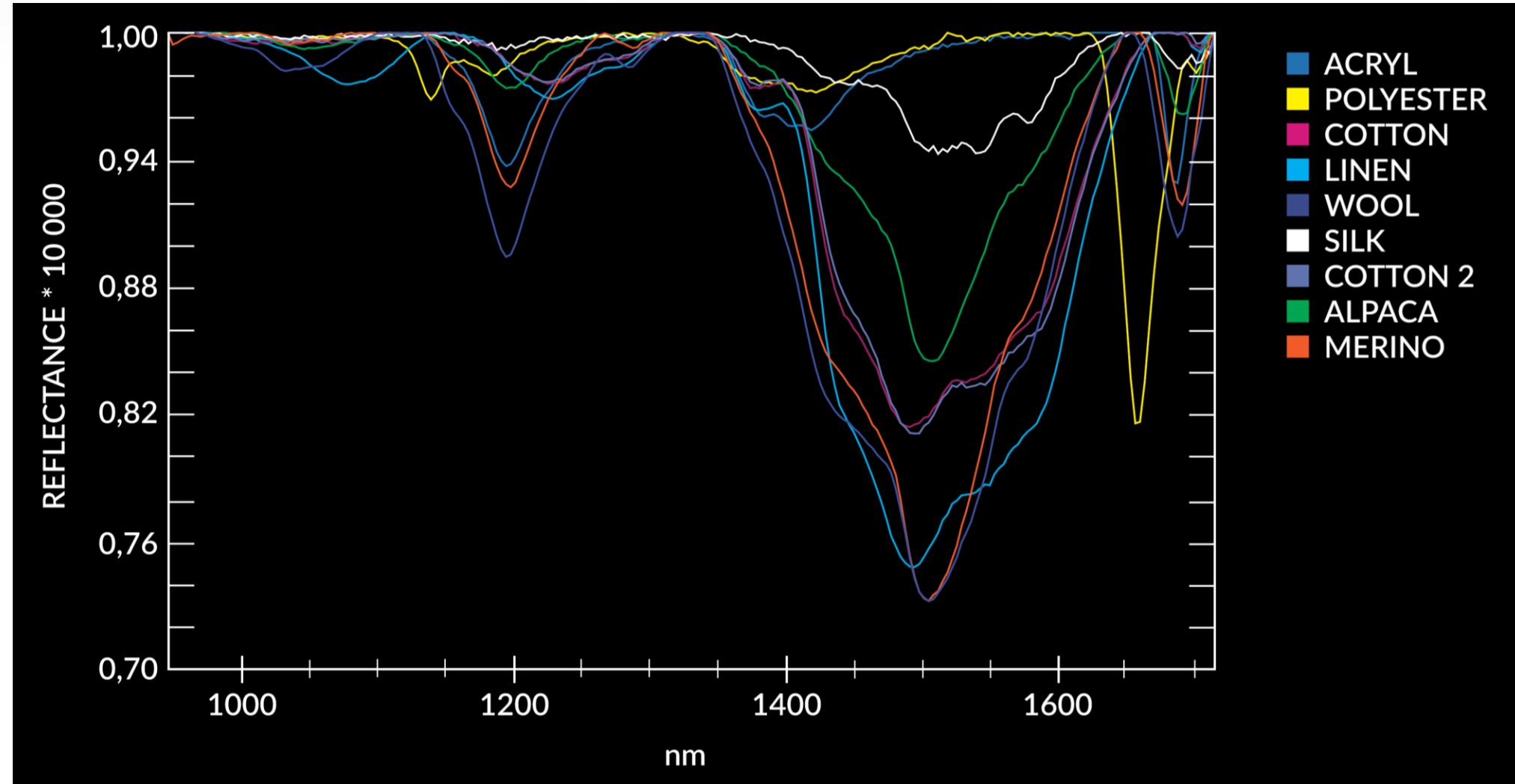
PLASTICS	FX10	FX17	SWIR	FX50
PE	YES*	YES*	YES*	YES*
ABS	Moderate	YES	YES	YES
PVC	Moderate	YES	YES	YES
PS	Moderate	YES	YES	YES
PA	Moderate	YES	YES	YES
PP	NO	YES	YES	YES
PC	NO	NO	YES	Moderate
PET	Moderate	YES	YES	YES



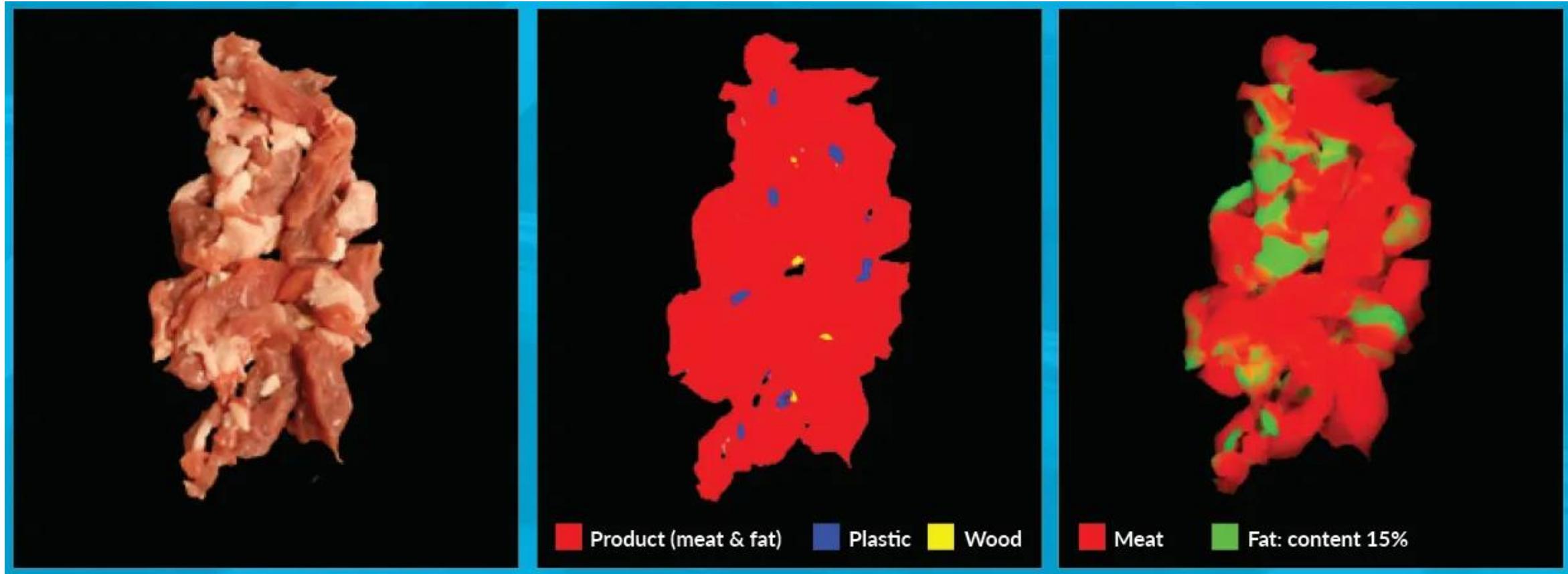
CASE PRODECLOGIA: 98% POLYMER PURITY



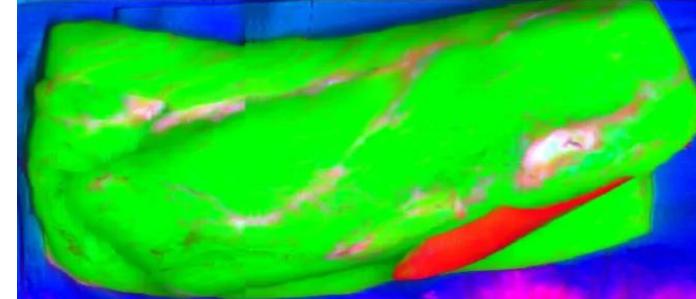
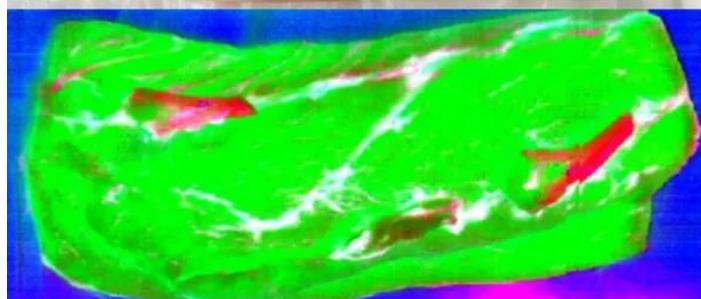
TEXTILE RECYCLING



FOOD: GRADING, QUALITY CONTROL AND FOREIGN OBJECT DETECTION



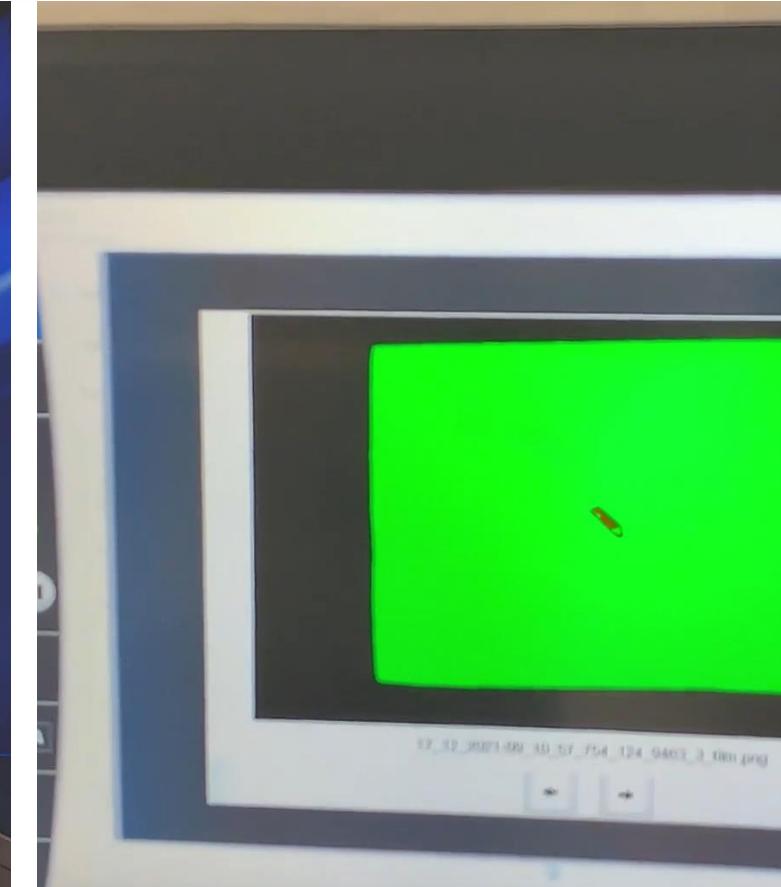
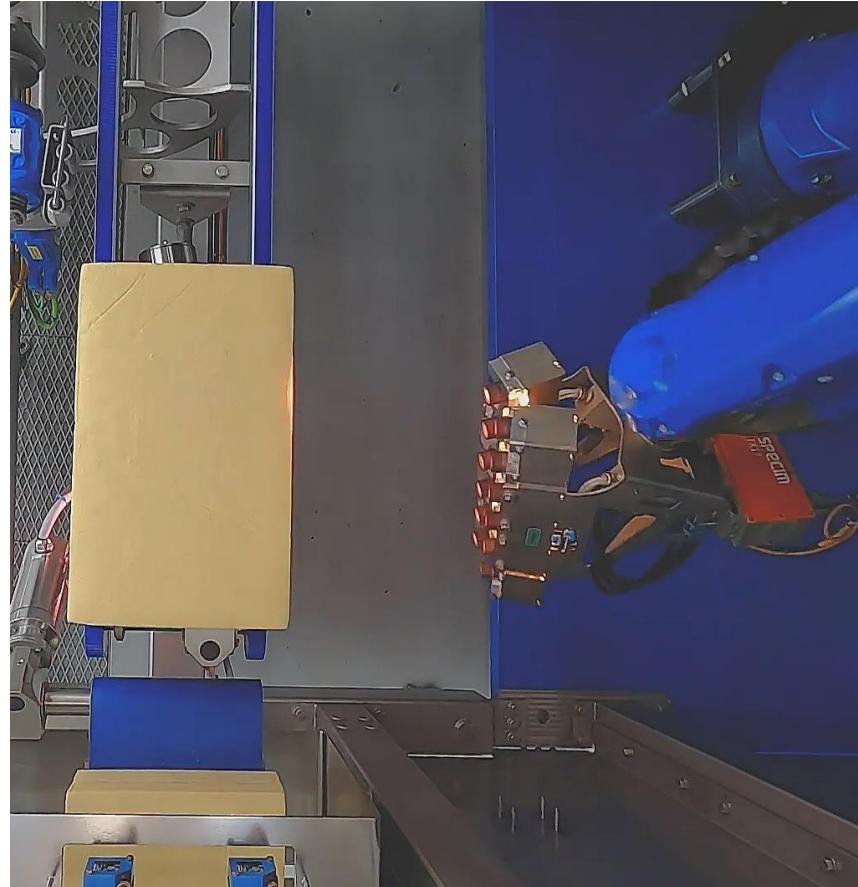
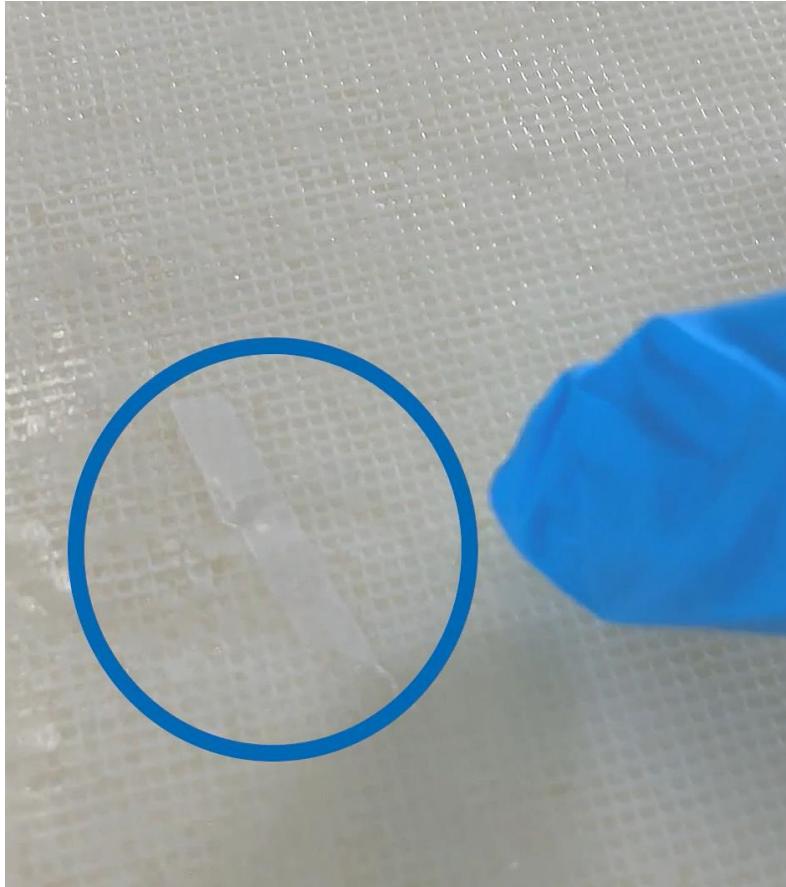
FOOD GRADING AND QUALITY CONTROL: CASE INNDEO



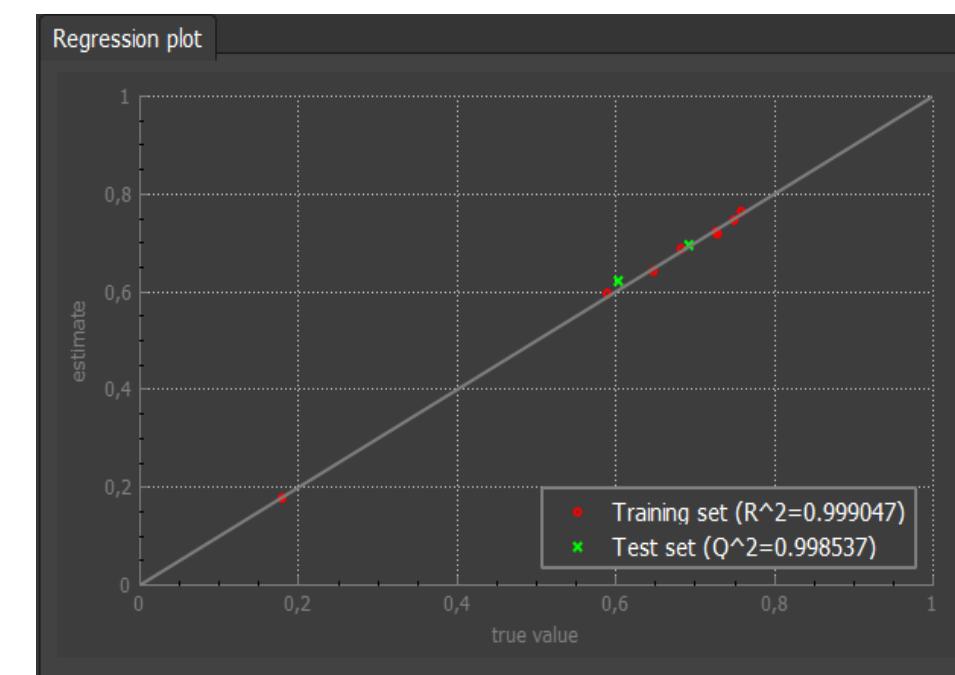
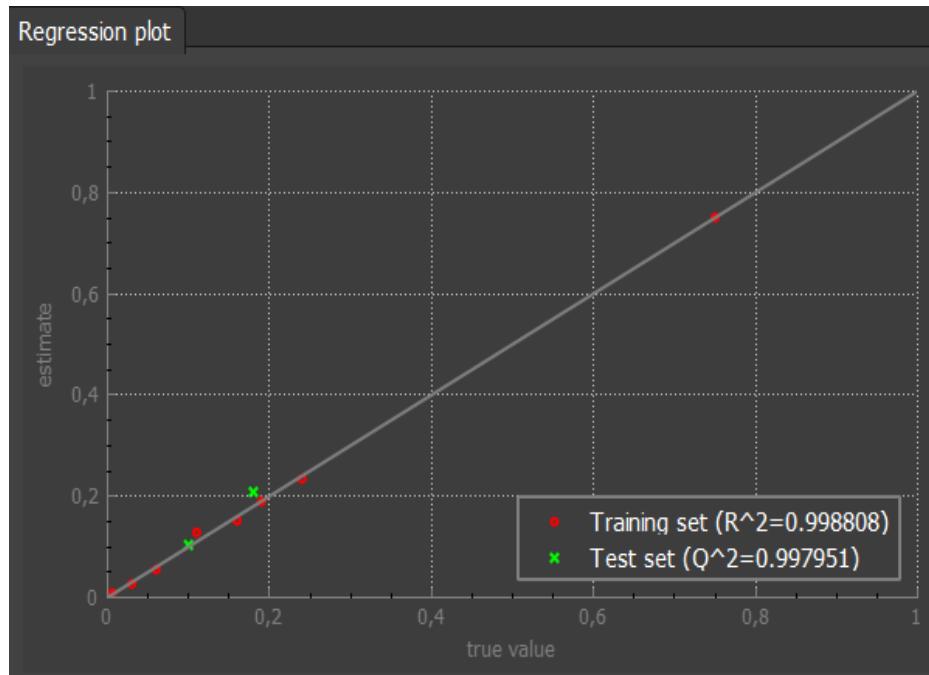
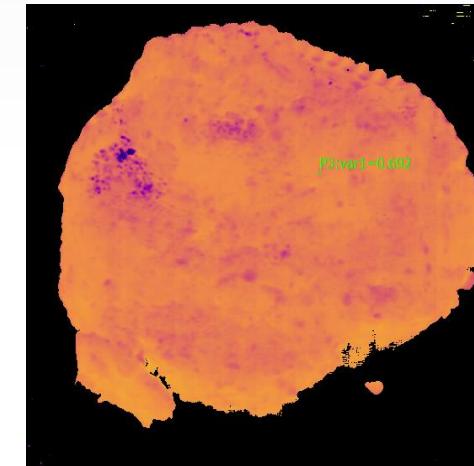
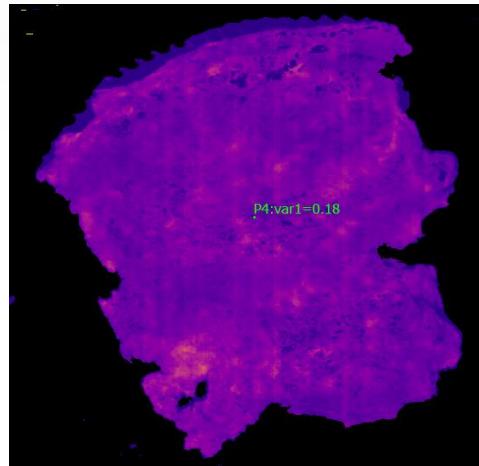
INSPECTING HEAT SEALED PACKAGING: CASE MINEBEA



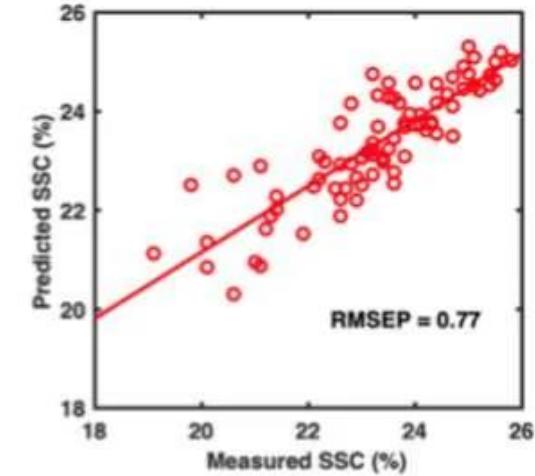
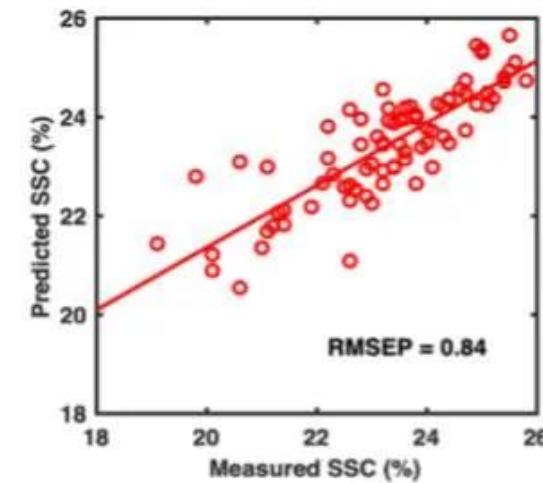
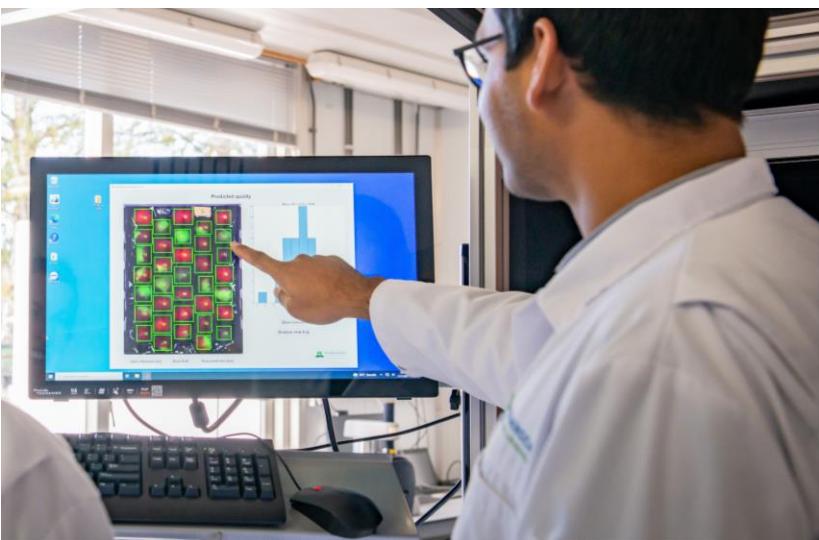
FOOD GRADING AND QUALITY CONTROL: CASE ALPMA



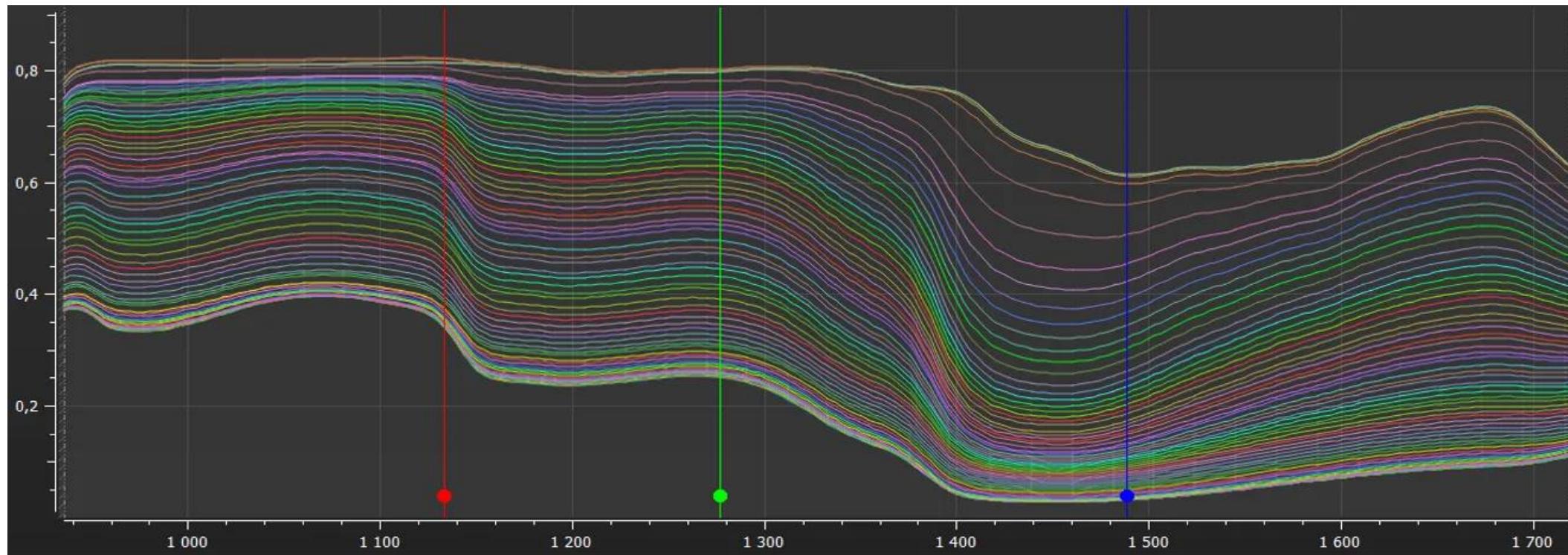
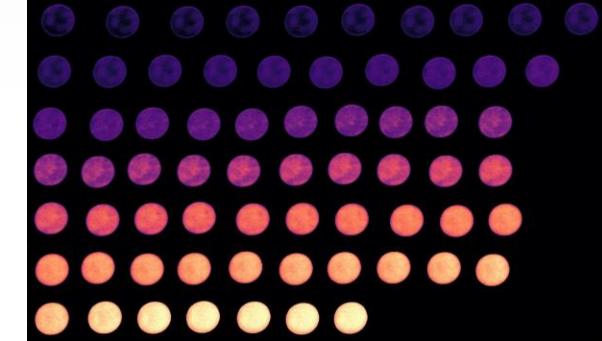
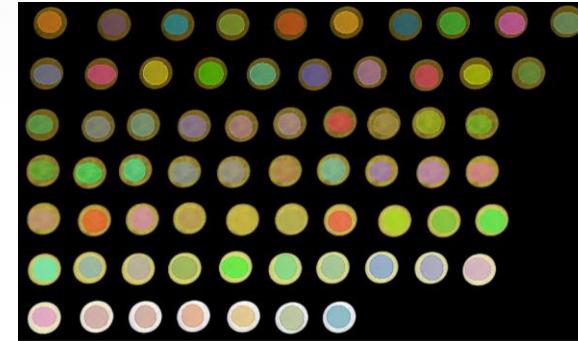
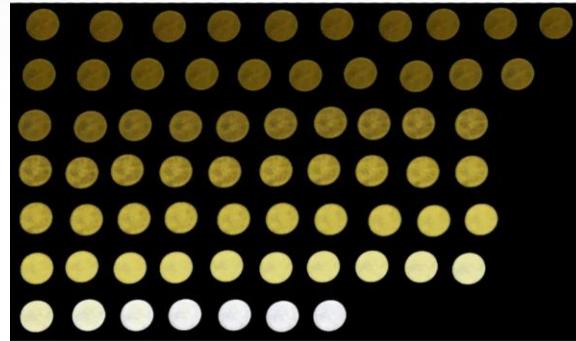
FOOD GRADING: MOISTURE AND FAT CONTENT



FOOD: ANALYSIS AND GRADING



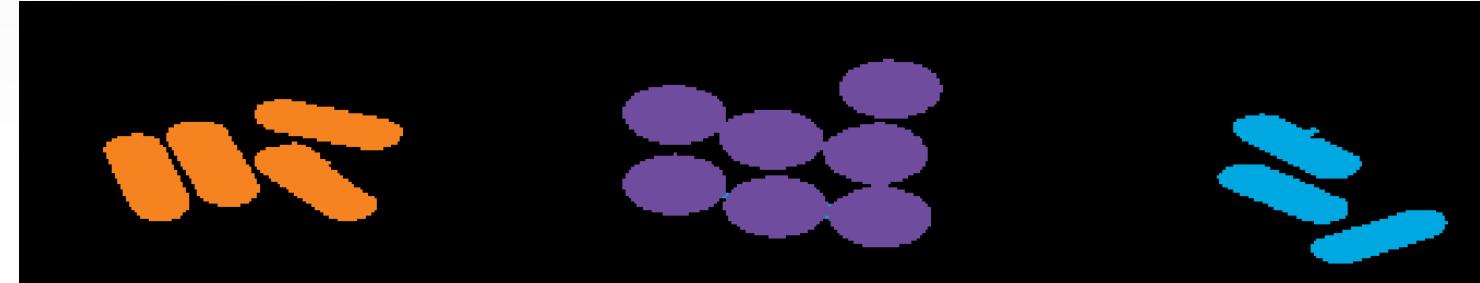
MOISTURE CONTENT ON COTTON



PHARMACEUTICALS: CASE SEA VISION



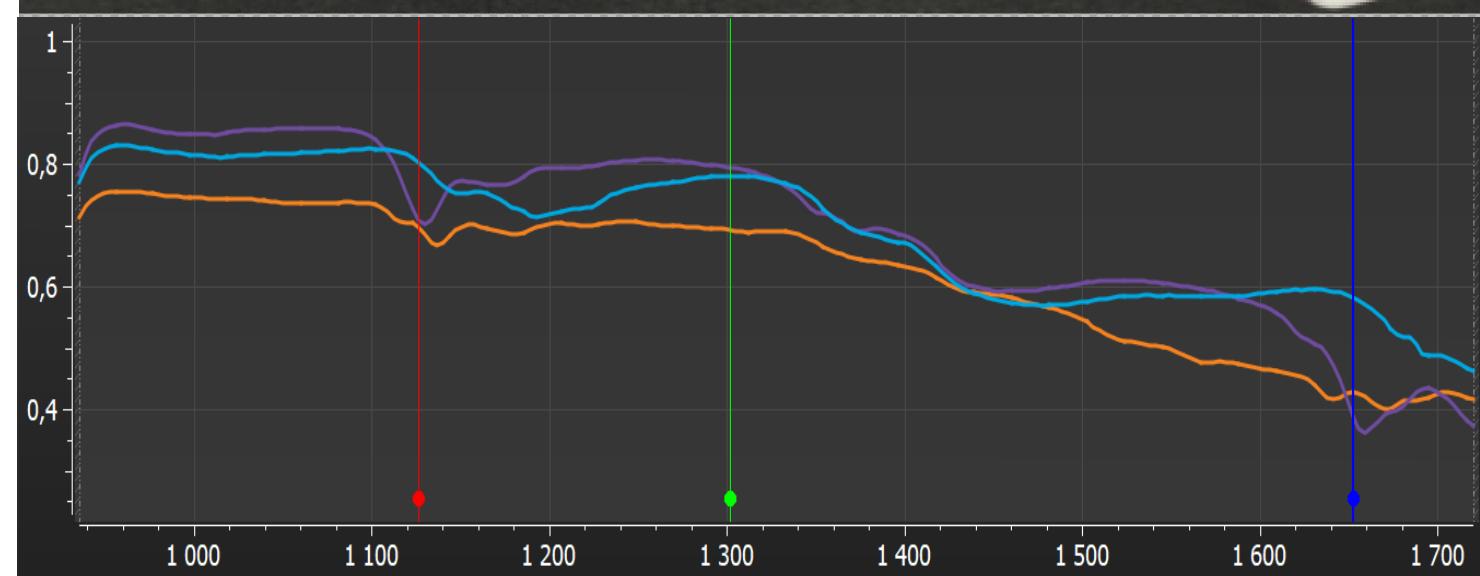
Paracetamol



Aspirin



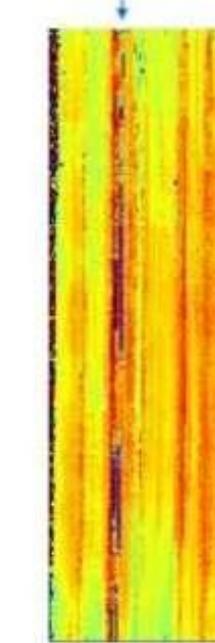
Ibuprofen



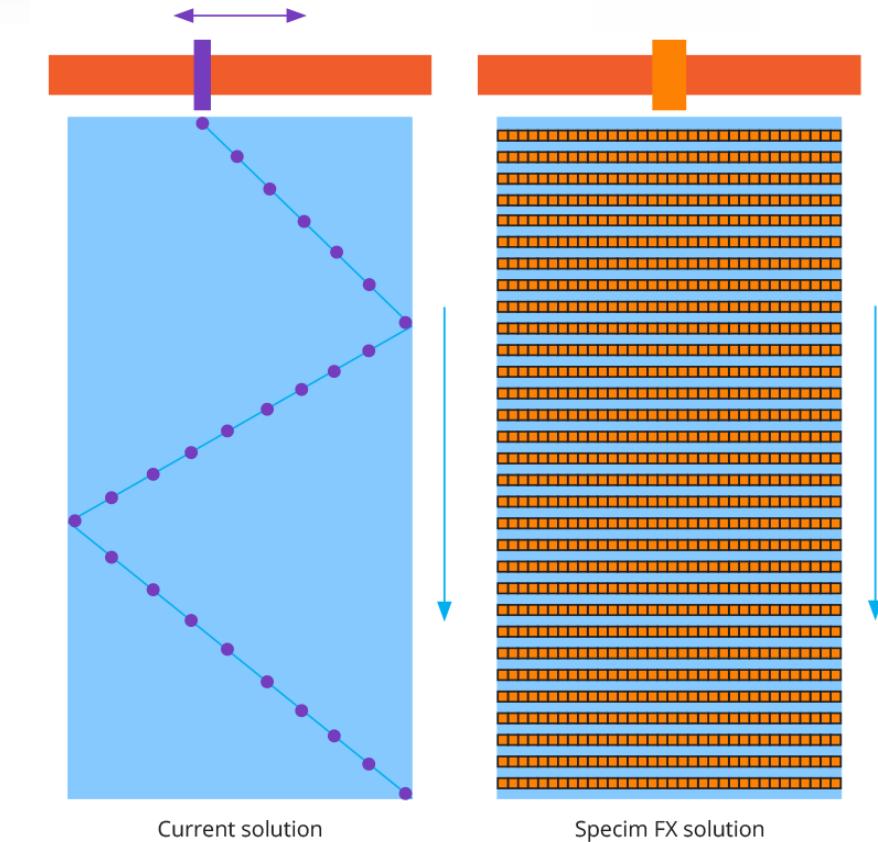
THIN FILM THICKNESS



PHOTO OF THE THIN FILM ROLL WITH THE DEFECT



HEAT MAP ON FILM 1





SPECIM'S OFFERING FOR NIR SPECTRAL RANGE

SPECIM NIR HSI CAMERAS



Specim FX17



Specim GX17

Spectral range	950 – 1700 nm	900 – 1700 nm
Spatial pixels	640	480
Spectral bands	224	168
Spectral resolution	8 nm	8 nm
Effective pixel size (at slit plane)	18.7 µm	24.9 µm
SNR @ max. signal	1000	700
Bit depth	12	16 (14 ENOBs *)
Maximum frame rate @ full ROI	670 CL / 527 GigE	800 (@ 0.5ms integration time)

DOWNLOAD FULL DATA SHEETS - GO TO WWW.SPECIM.COM

ACCESSORIES



LabScanner 40 x 20

Small scanner frame for laboratory use.



LabScanner 100 x 50

A larger scanner frame for laboratory use.



RS10 Rotary Stage Scanner

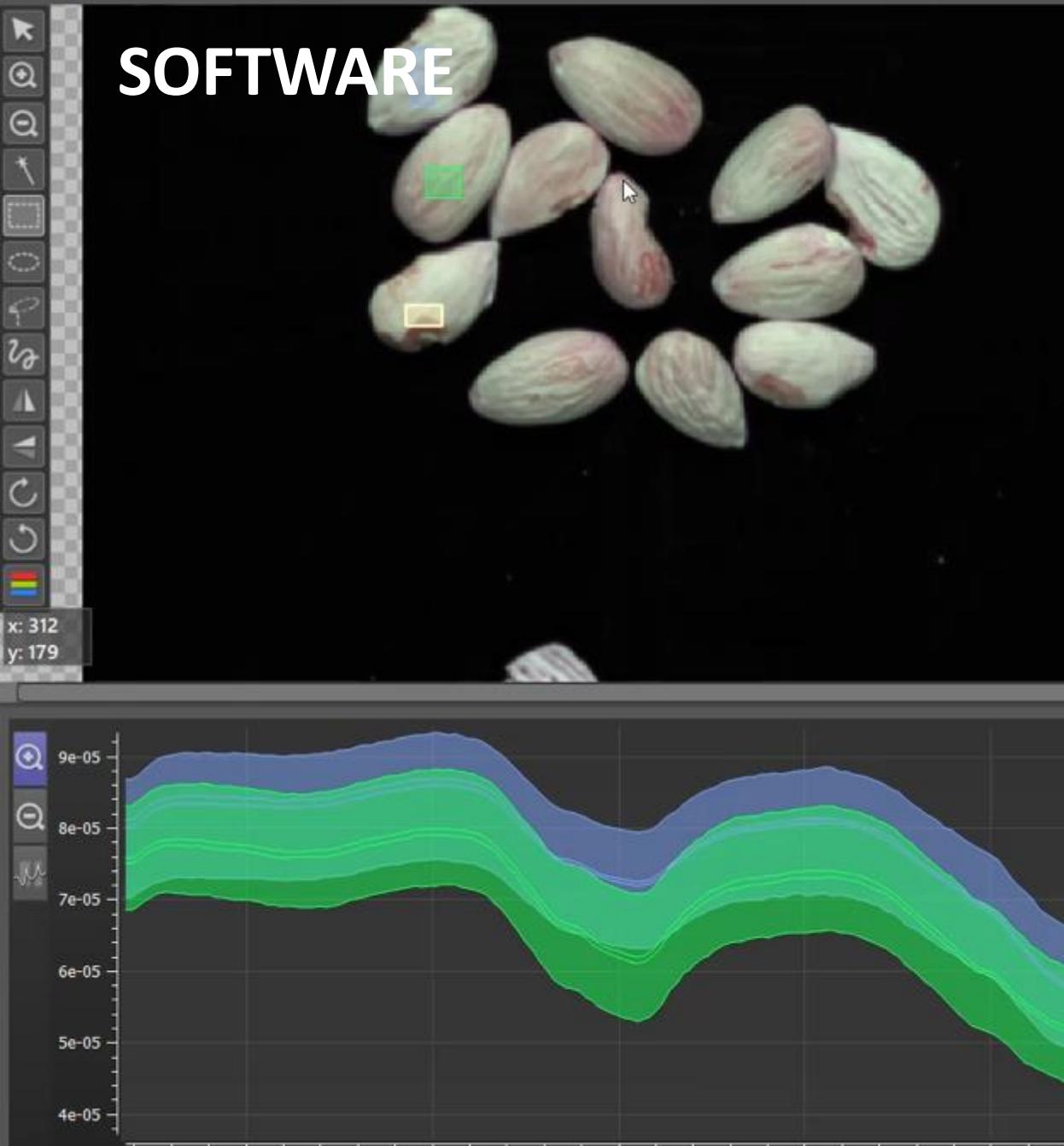
Scan an image of a stationary target or scenery in the lab and field. Maximum payload 10 kg.

NIR REMOTE SENSING



Specim AFX17

- Compact all-in-one hyperspectral imaging solution for drones
- 900 – 1700 nm



SpecimINSIGHT



Lumo family

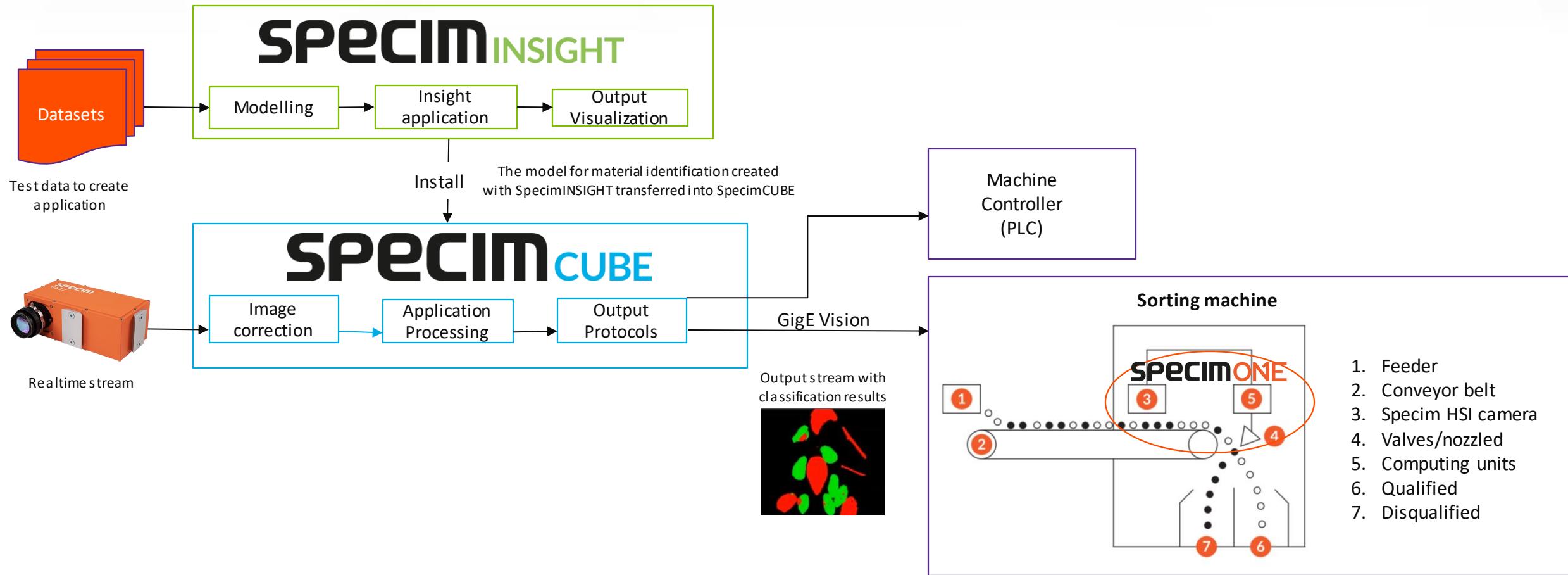
SPECIM ONE



- ✓ Acquire spectral data
- ✓ Create classification models offline
- ✓ Apply the models real-time into an in-line system
- ✓ No need for coding or in-depth knowledge of spectral imaging!

HOW TO INTEGRATE SpecimONE IN-LINE?

SPECIM ONE



ILLUMINATION COMPONENTS USED WITH NIR WAVELENGTHS

	PROS	CONS	Notes!
HALOGENS	<ul style="list-style-type: none"> • Low-cost • Continuous spectra over 400 – 2500 nm • Good IR emission 	<ul style="list-style-type: none"> • Short lifetime • Produces heat • Requires optical mechanics to be focused • Has poor blue emission and high intensity at ca. 1000 nm 	<ul style="list-style-type: none"> • Not optimal for color measurements
LED	<ul style="list-style-type: none"> • Can be tuned • No heat • Long lifetime • Collimated line light 	<ul style="list-style-type: none"> • More expensive than halogens • Not very bright 	<ul style="list-style-type: none"> • Suitable especially for color applications and where heat matters
LASER	<ul style="list-style-type: none"> • Tunable • Bright collimated line • Continuous spectrum 	<ul style="list-style-type: none"> • Expensive • Spectrum at the middle of the line is different from the edges • The signal dropped significantly after 2350 nm 	<ul style="list-style-type: none"> • Class 4 lasers require safety instructions for integration and usage •
SUNLIGHT	<ul style="list-style-type: none"> • Homogeneous • A relatively continuous spectrum over 900 – 1700 nm • Free 	<ul style="list-style-type: none"> • Available only during the day and outdoors • Clouds affect the IR emission • Atmospheric absorption peaks 	<ul style="list-style-type: none"> • Clouds can be disturbing

“Integrating HSI to machine vision equipment, we automate the work of 2-3 people per shift, resulting in up to 100k € savings per year. We also reduce the risks of quality failure, which can save 100-500k € of penalties.”

– Emilio J. de la Red, Head of Innovation, Inndeo Engineering





“Our plastics sorter ECOPACK, equipped with Specim FX17, can sort up to 6 tons of plastic packaging per hour. This was previously done by six workers.”

– Daniel Carrero, Product Manager, Picvisa



“The implementation of the NIR separator with the SpecimONE only took six months, which was a vast improvement compared to other systems that were stuck in development for several years and never reached full completion.”

– Andrii Honchar, Chief Technologist,
Prodecologia

CONTACT US TO:

- MEASURE A SAMPLE
- ARRANGE A DEMO
- ASK FOR A QUOTE

www.specim.com / info@specim.com



DON'T MISS OUR NEXT WEBINARS!



THURSDAY 16.11.2023



THURSDAY TBD

Q&A

The background features a minimalist design with a white central area. Around the perimeter, there are four distinct color blocks: purple and blue in the lower-left, and orange and yellow in the upper-right. These colors are overlaid with thin, white, curved lines that intersect to create a sense of depth and movement.

THANK YOU!

SPECIM



A Konica Minolta Company