Specim

Making spectral imaging possible

SPECIM, Spectral Imaging Ltd.

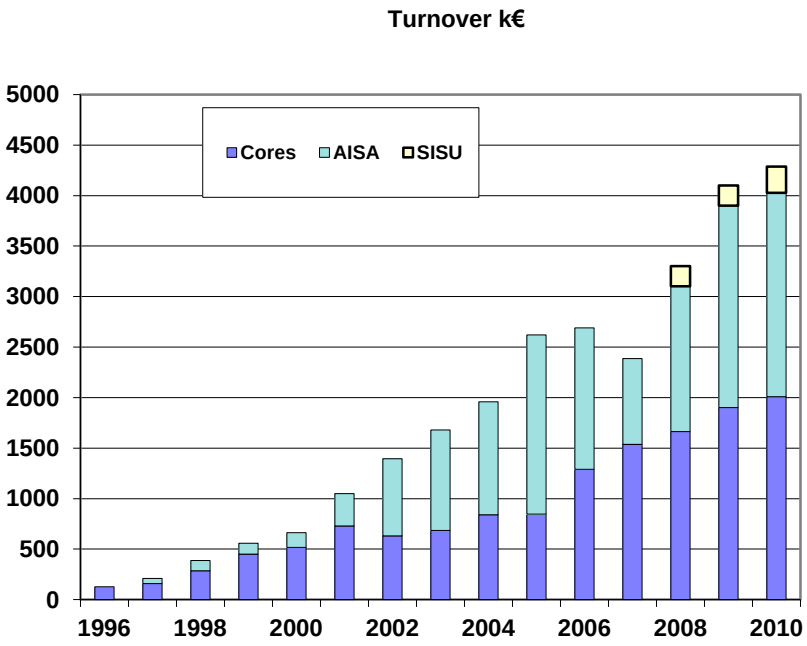
World leading manufacturer and suppplier for hyperspectral imaging technology and solutions

Hundreds of customers worldwide.

Distributor and integrator network covers more than 40 countries

We make hyperspectral imaging possible

SPECIM 2010



Profitable from 1999

International skilled team of 31 people

Established, long term customer relationships

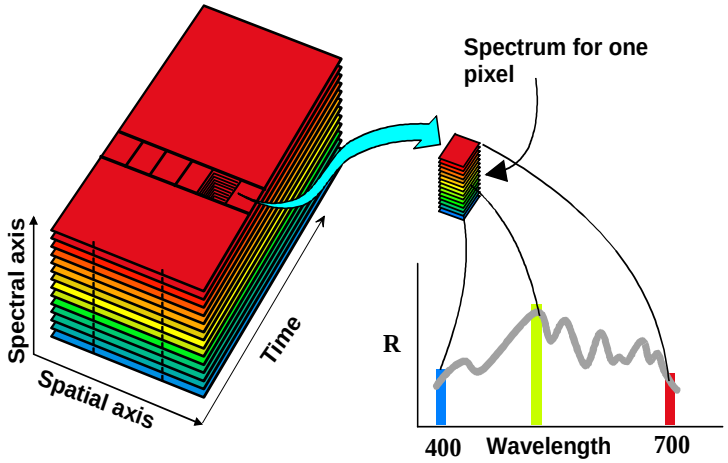
International network of distributors, R&D partners and suppliers

Turnover

- **40 % Europe**
- **20 % Americas**
- **30 % Asia**
- **10 % others**

What is Hyperspectral Imaging?

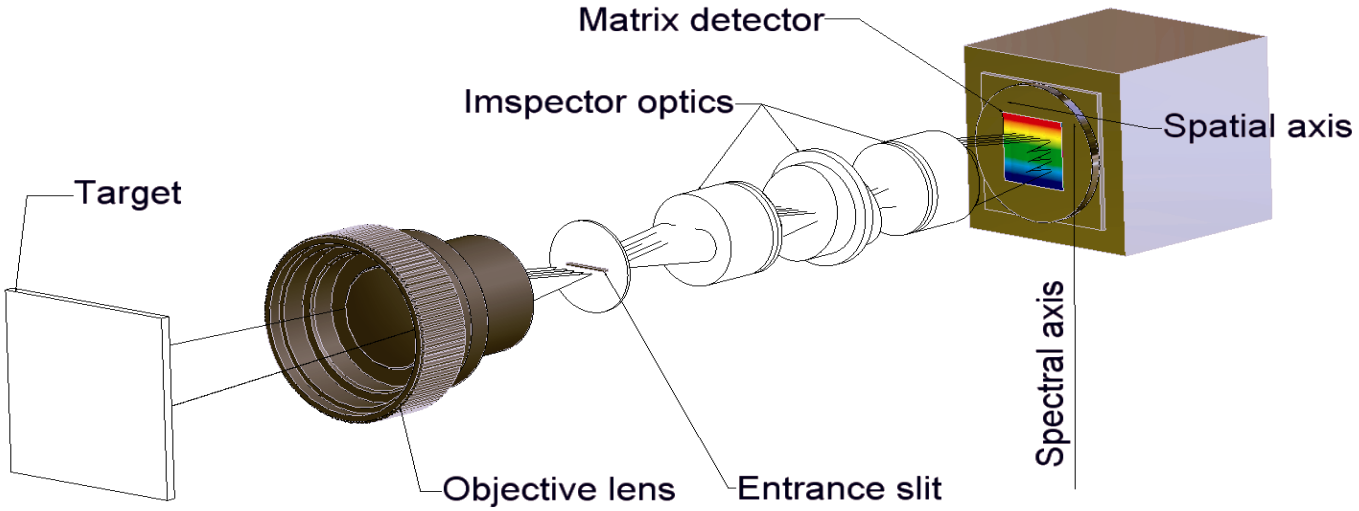
Combines digital imaging with spectroscopy – Provides spectral information in each image pixel



- Each pixel is associated with the spectral signature of the target
- Spectral signature includes information about
  - precise color
  - chemical composition, and/or
  - temperature
- Hyperspectral imaging is used in new generation
  - machine vision solutions
  - life science imaging systems
  - QA and process control systems
  - airborne and security imagers

Push-Broom approach

- A line-scan device
- Full spectra of the all spatial positions along the imaged line is recorder in one single snapshot
- Target must be imaged line-by-line to form the 2D image

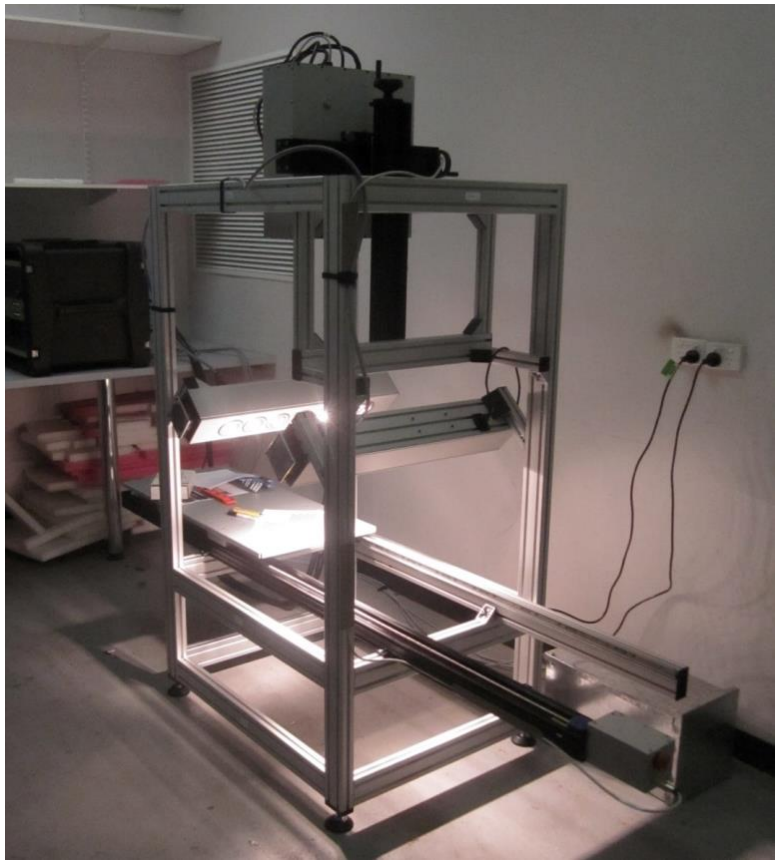


How to aquire 2D spectral images?

- Moving target
- Moving spectral imager
  - Airborne remote sensing
- Mirror Scanner in front of the spectral camera
- Rotary stages

How to aquire 2D spectral images?

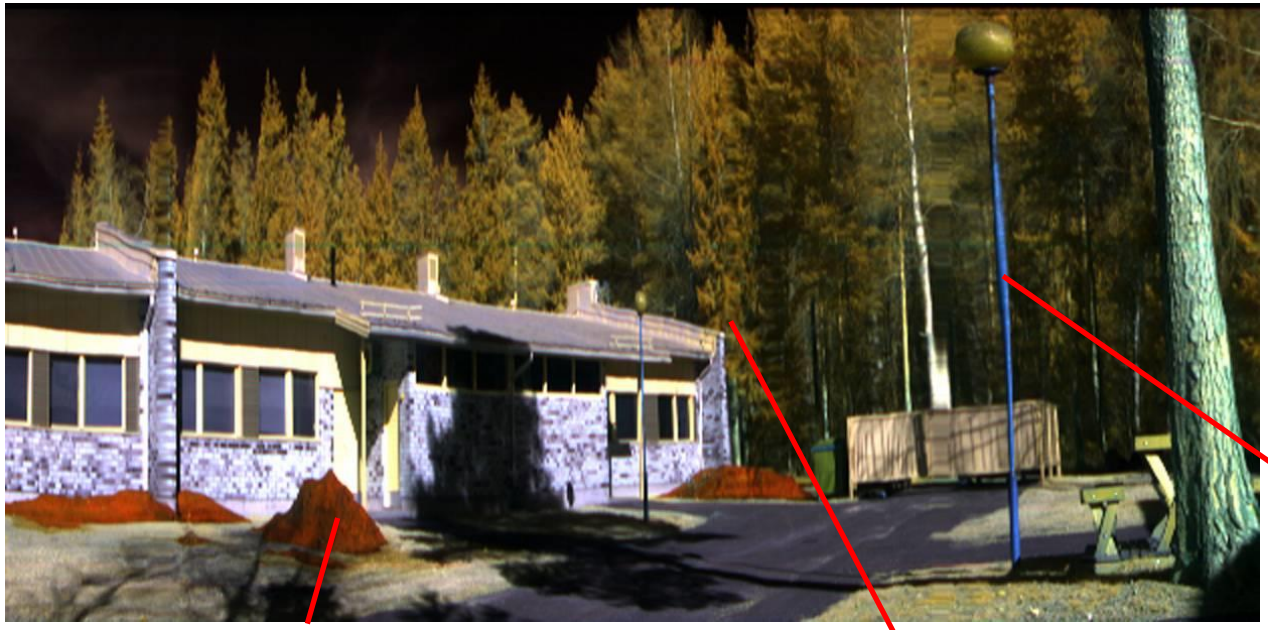
- Desktop and microscope scanners employing an X-stage for moving the sample

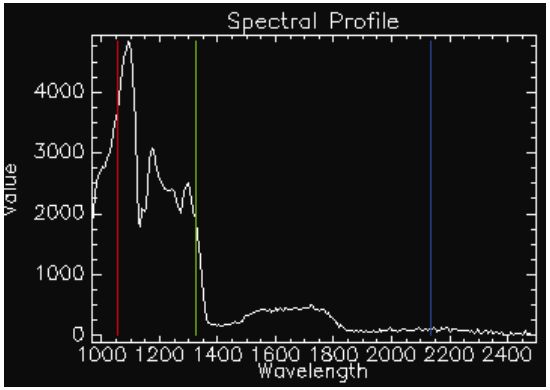


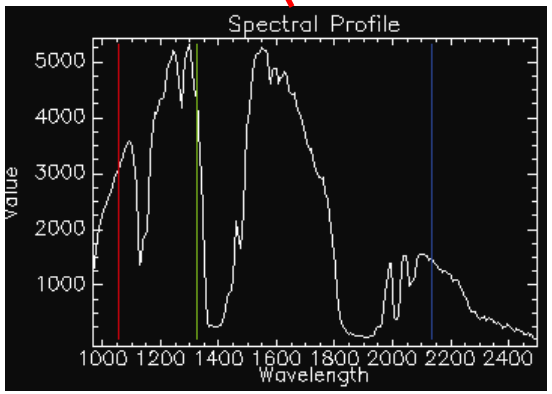
Wavelength ranges

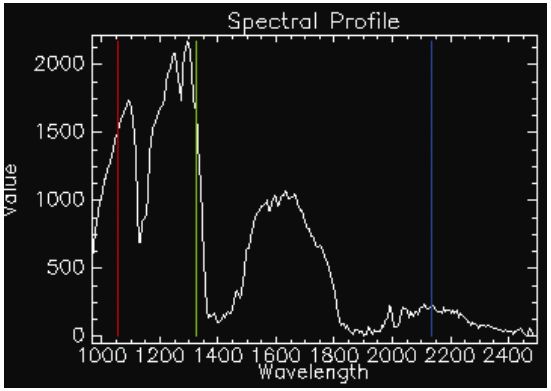
- Specim is providing push-broom hyperspectral imaging devices for the following wavelength ranges
  - *UV (200 - 400 nm)*
  - *VIS (380 - 800 nm)*
  - *Raman (500 - 900 nm/800 - 1000 nm)*
  - *VNIR (400 - 1000 nm)*
  - *Extended-VNIR (600 - 1600 nm)*
  - *NIR (900 - 1700 nm)*
  - *SWIR (1000 - 2500 nm)*
  - *MWIR (3 - 5 um)*
  - *LWIR (8 - 14 um)*

Hyperspectral image









Specim Products

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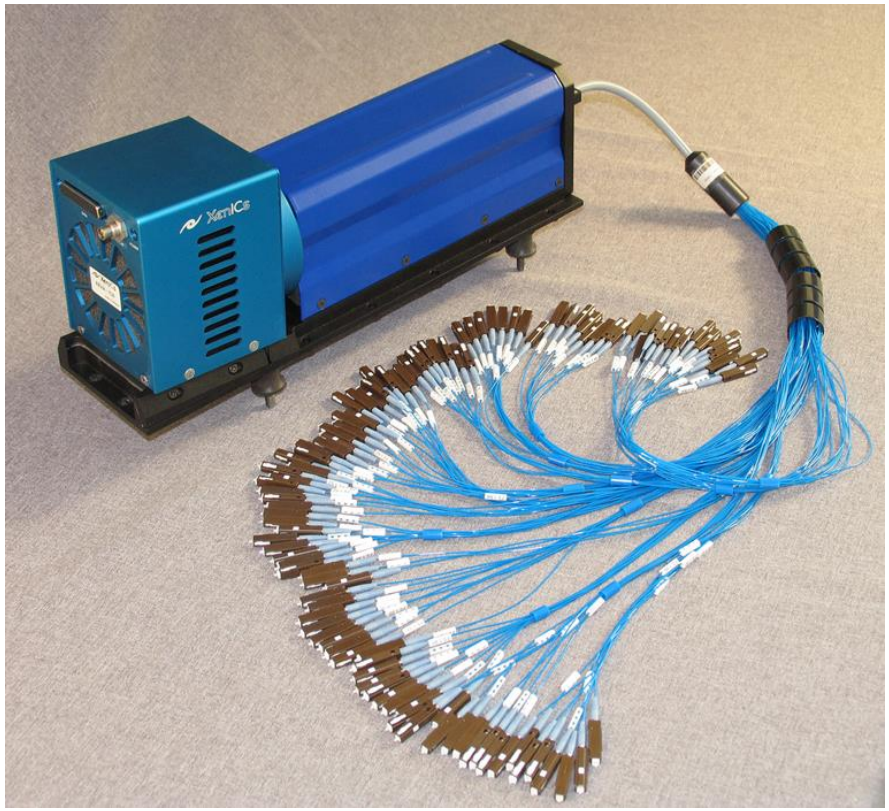
CORE - Products and customers 1/3

- ImSpector Imaging Spectrographs
- Spectral Cameras and software
- Custom Spectrometer modules
- Accessories (fore lenses, filters, fiber optics, scanners)

FOR

- Industrial instrument manufacturers and system integrators
- Scientific users
- Defense and security users

Multichannel measurement



- Models for 200 – 2500 nm
- User selectable
  - Amount of channels (limited by detector width/fiber diameter)
  - Length of channels (can vary)
  - Size of the fiber (65/100/200/400 um)
  - Connector/collection lens type (SMA, MU)

SISU - Products and customers 2/3

- SISU Chemical Imaging Solutions
- sisuCHEMA, for
  - *Pharmaceutical research and industry*
  - *Food and agriculture*
- sisuROCK
  - *Mining industry and geological research*

AISA - Products and customers 3/3

- AISA Airborne Hyperspectral Systems

FOR

- Commercial remote sensing service providers
- Remote sensing research
- Environmental research
- Defense and security users

Applications

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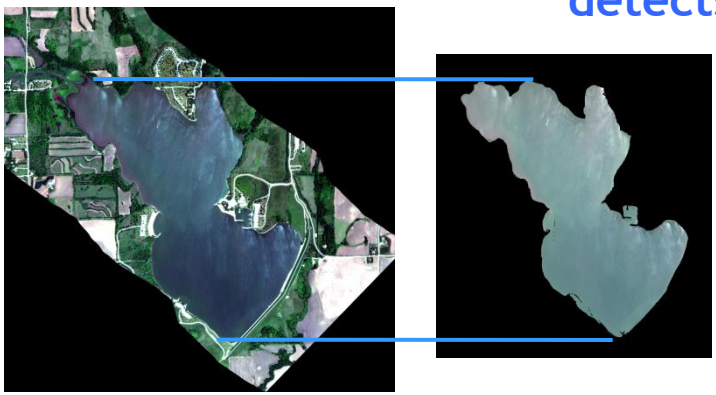
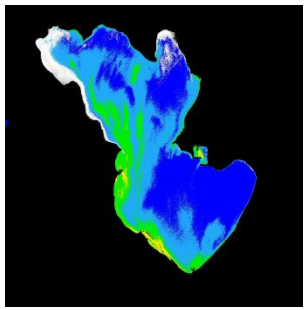
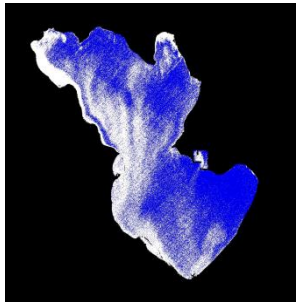
Where are SPECIM products used?

Airborne hyperspectral imaging detects and classifies targets

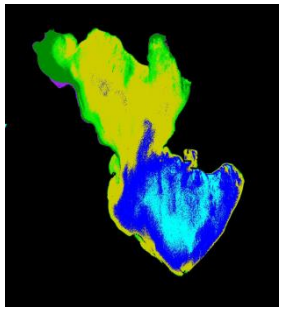




Chlorophyll-a map



Phycocyanin map



Total solids content

Which farm field areas need fertilizers pesticides ?

How is oil spill clean-up progressing?

Is a region hiding drug plantations?

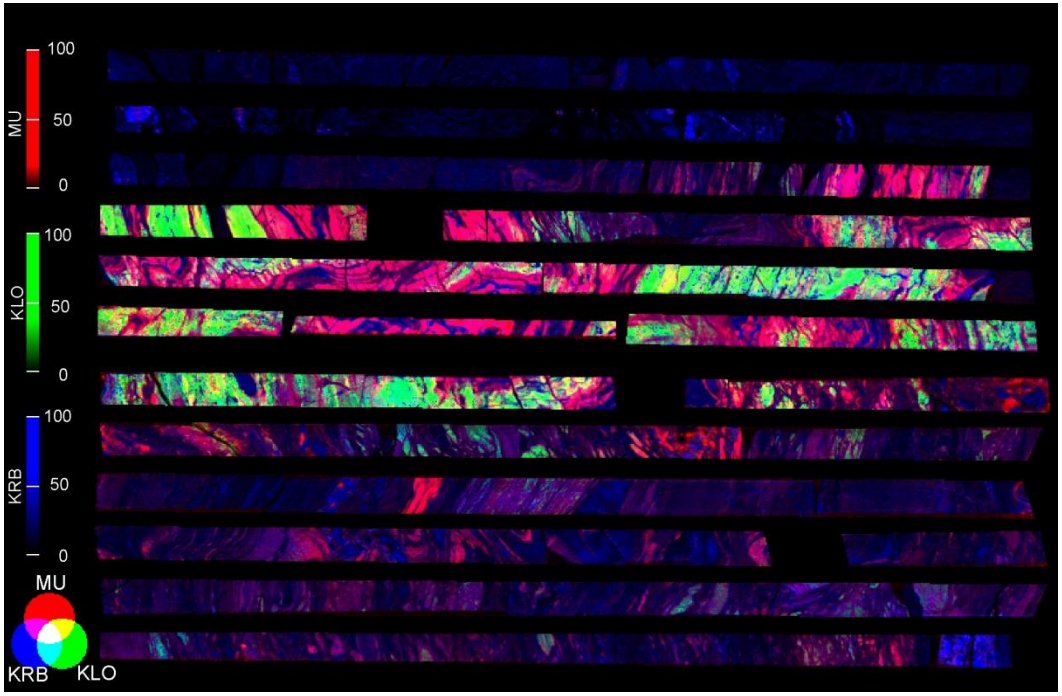
Are there camouflaged military targets, and are they operative?

Customers: Astrium, Spectir, Pasco, USDA, Ministry of Defence in Japan, Singapore, Israel and India

Where are SPECIM products used?

Geology - drill core scanning

- New information content compared to traditional geological mapping
- Faster than thin section analysis
- Scan results can be electronically distributed to a wide group immediately after drilling
- Repeatable and consistent
- Easy access by computer to accurate and complete information

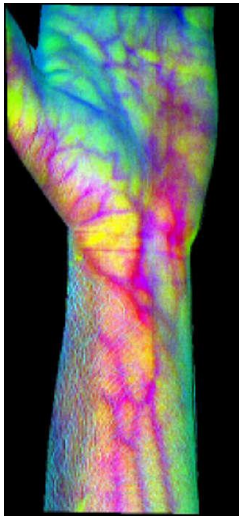


Courtesy of Geological Survey of Finland,
Jukka Laitinen and Viljo Kuosmanen

Where are SPECIM products used?

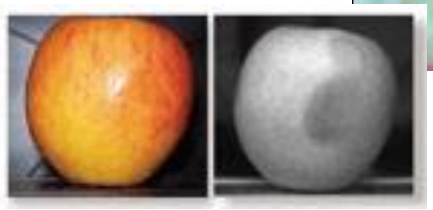
Hyperspectral imaging
sees much more than the human eye

Is a change in human skin hiding an early phase melanoma?



What is the origin of a forensic sample?

Are there defects in fruit that get them spoiled too early?



Customer examples: Themis Vision, NASA, FBI, Italian and Japanese police, AMC, Universities

Where are SPECIM products used?

Hyperspectral imaging
accurately measures and sorts colors

Do colors drift in a dyeing or high quality printing process?

Do flat panel displays meet the color standards?

Are ceramic floor tiles of same color from batch to another?

What is the spectral contents of an old work of art?

Customer examples: Rohm, Canon, Seico, MsMacro Systems, Kawasaki, Topcon, Iris

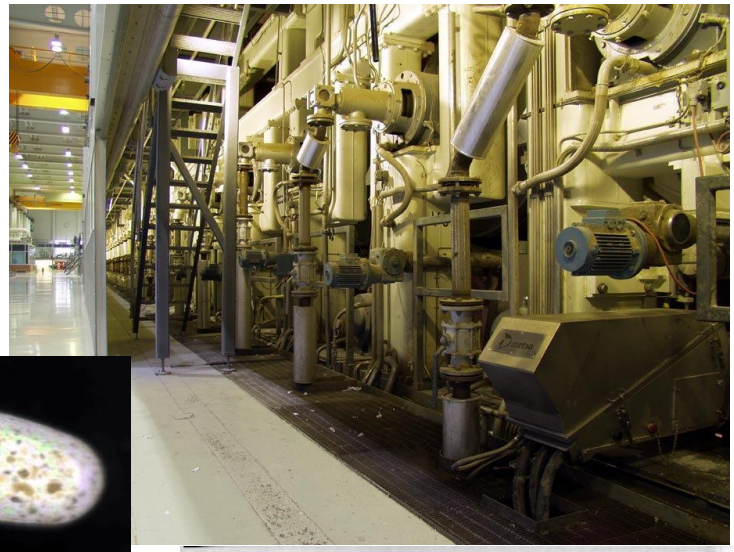
Where are SPECIM products used?

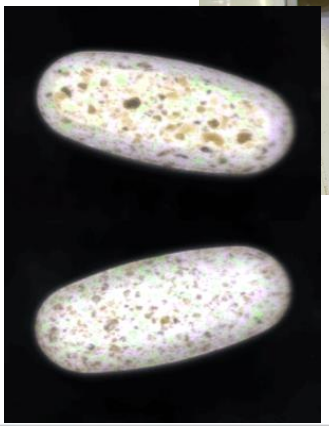
Hyperspectral imaging perceives chemical compositions

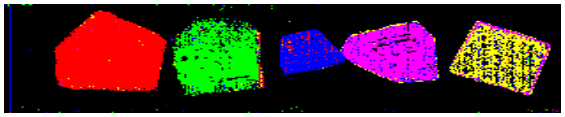
Is moisture content even across the paper web?

Are pharmaceutical pills homogenoues in their chemical structure?

How to distinguish and sort plastics in a recycling process?





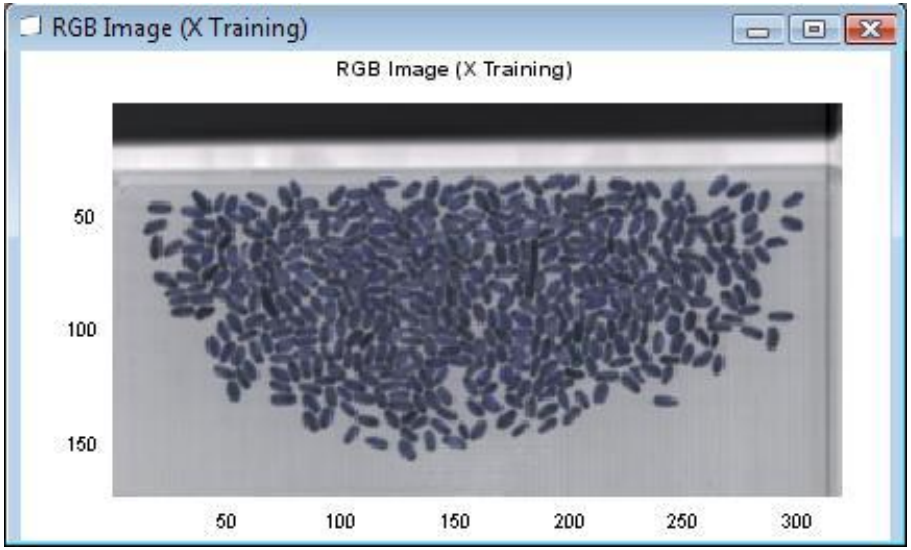


Customer examples: Metso, Binder, Monsanto, Kawasaki, USDA, Sandia Nat. Lab., Anglo American

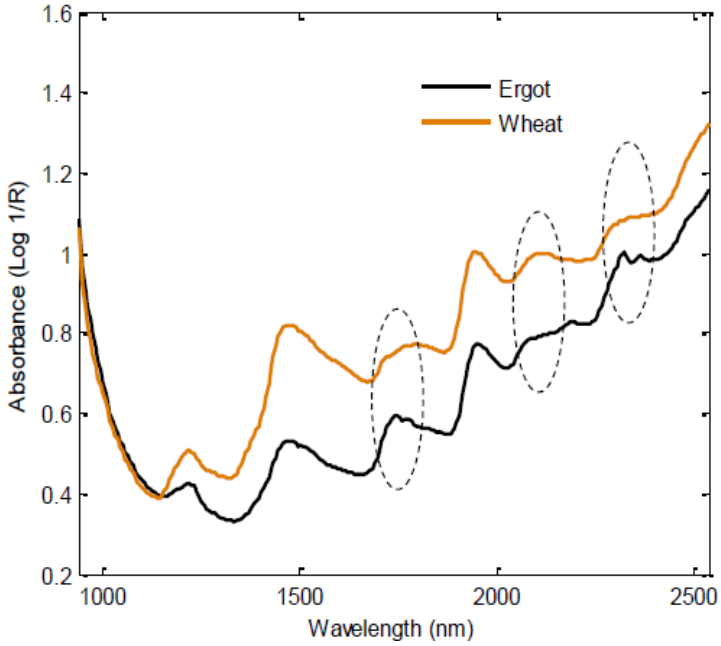
Detection and modelling of ergot on wheat kernels

- Detection of fungies in wheat
  - *Toxicity*
  - *Norm:<0.05%*
- SWIR (1000 – 2500 nm)

Detection and modelling of ergot on wheat kernels



False RGB image



Continuous spectra

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