LLA instruments

SCAN • SORT • SUSTAIN

Paper Recycling

Hyperspectral imaging systems for paper sorting and recycling

Precise sorting based on material composition, improving efficiency and achieving higher-purity bales

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Impact of Paper Recycling
with hyperspectral imaging technology

Did you know?

Recycling one ton of paper saves **17 trees**, **7,000 gallons of water**, and reduces landfill burden. Yet only **50 - 60 %** of the 400+ million tons of paper produced annually is recycled. The rest ends up in landfills, wasting valuable resources and creating avoidable environmental impact.

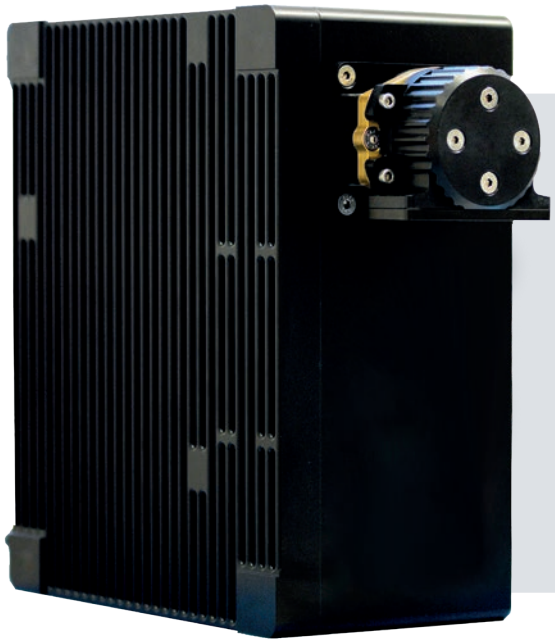
The challenge...

Sorting different paper types and removing contaminants are significant challenges in recycling, often resulting in lower purity and value of recycled materials.

Our NIR/SWIR technology for efficient paper recycling

Our hyperspectral imaging technology enables fast, non-contact, and precise sorting based on material composition, not just colour or shape. This allows recyclers to:

- Separate **coated** versus **uncoated** papers
- Identify and sort **carrier boards**, **corrugated cardboard**, **office paper**, and **newspapers**
- Detect and **eliminate contaminants** such as plastics, foils, adhesives, etc.
- Improve sorting efficiency and achieve **higher-purity bales** for better market value.



Our core technology:

KUSTA

Hyperspectral Camera

- Distortion-free lens for high spectral and spatial resolution
- High frame rates, enabling conveyor belt speeds up to 3 m/s
- Extended spectral ranges for accurate sorting

LLA Instruments NIR/SWIR sensor solutions are easily integrated into paper sorting processes

KUSTA-System

Hyperspectral Imaging System

Advantages

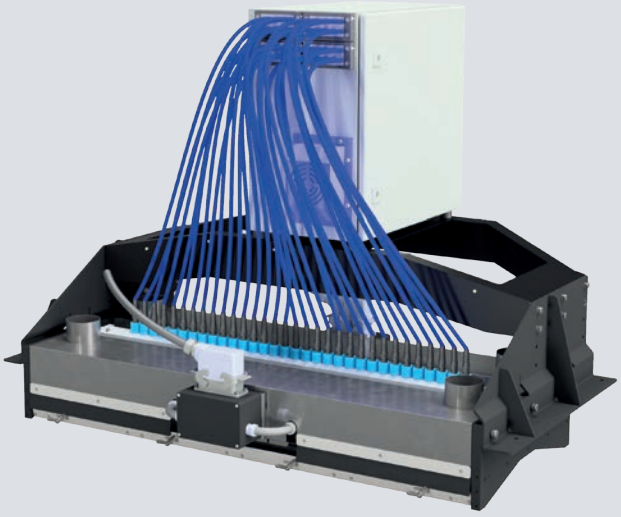
- Accurate identification of paper and cardboard types
- Precise sorting for high-purity bales
- Detects contaminants like plastics, wood, adhesives, foil etc.
- Enables high-speed sorting for industrial-scale paper recovery up to 3 m/s
- Delivered as a ready-to-mount system for easy installation
- Built for dusty, harsh recycling environments

Complete System Includes:
KUSTA Hyperspectral Camera and Lens, Illumination Unit, Calibration Unit, Mounting Bridge PC with Control Software, Power Supply

Application Routines
pre-trained for your sorting requirements

Tailored as per your system requirement

Optional RGB linescan camera
for enhanced colour and shape analysis



KUSTA-MPL

Multiplexed Process Spectrometer

Advantages

- Precise chemical composition analysis for paper identification
- Detects moisture content in paper streams
- Optimised for larger particles (>30 mm), sorting at up to 3 m/s
- Scanning multiple conveyor belts with a single unit
- Integrated sensor for colour and spectral data capture

Complete System Includes:
KUSTA-MPL Spectrometer, Illumination Unit, Calibration Unit, PC with Control Software, Power Supply

Application Routines
pre-trained for your sorting requirements

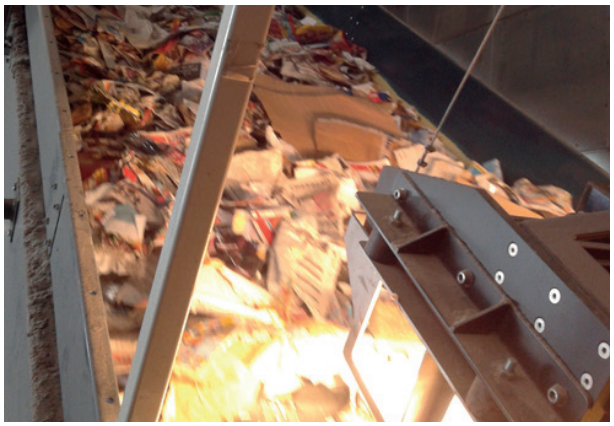
Tailored as per your system requirement

Flexible fibre optics
for a variety of installation setups

Identification of paper in real-time with specialised analytical software

idPaper Software Module

The **idPaper** module is a ready-to-use application for waste paper identification. Compatible with both of our KUSTA-MPL and KUSTA-System.



Capabilities:

- **Precise paper identification**
  Detects and classifies various paper types such as:
  - Coated and uncoated papers
  - Corrugated cardboard
  - Carrier boards
  - Office paper
  - Newspapers
- **Contaminant detection**
  Effectively detects contaminants like plastics, wood, foils, adhesives etc.
- **Enhanced recycling efficiency**
  Enables high-purity bales with real-time, non-contact analysis
- **Moisture content detection**
  Identifies moisture content in paper for better quality control
- **Material differentiation**
  Distinguishes between similar materials, like coated/uncoated paper and plastics

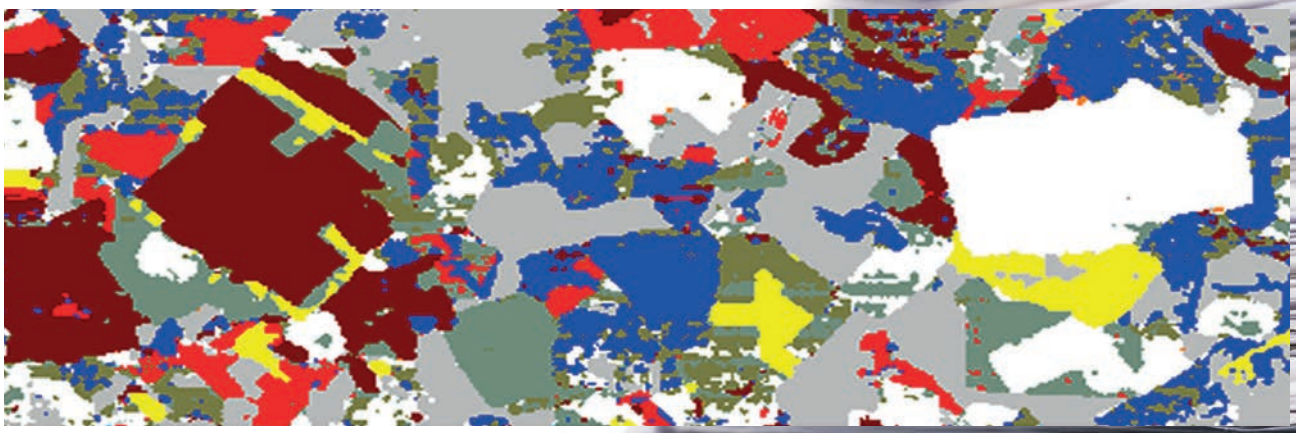
Flexible integration:

- **Seamless**
  Easily integrates with new or existing paper sorting lines
- **Customisable**
  Adaptable to various sorting requirements
- **Standards compliant**
  Designed to meet current waste paper recycling industry standards

Each paper grade has a characteristic NIR/SWIR spectrum, which idPaper assesses and classifies in accordance with the EN643 European list of waste paper grades

Camera picture: used-paper stream on a conveyor belt

NIR analysis: of the composition of the used-paper stream



- Background (belt)
- Carrier Board
- Corrugated Cardboard
- Plastics
- Newspaper
- Office Paper

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LLA instruments

scan

with hyperspectral and x-ray fluorescence
technology for precise material analysis

sort

with optical sensor-based systems
for fast, high-throughput processing

sustain

with flexible software programmes
to adapt to new material demands

Contact us to find the optimal solution for your application:

LLA Instruments GmbH
Justus-von-Liebig-Straße 9/11
12489 Berlin, Germany

T: +49 30 629 0790-0

E: mail@lla.de

www.lla-instruments.de

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