Ensuring quality : operational challenges and the need for advanced inspection solutions

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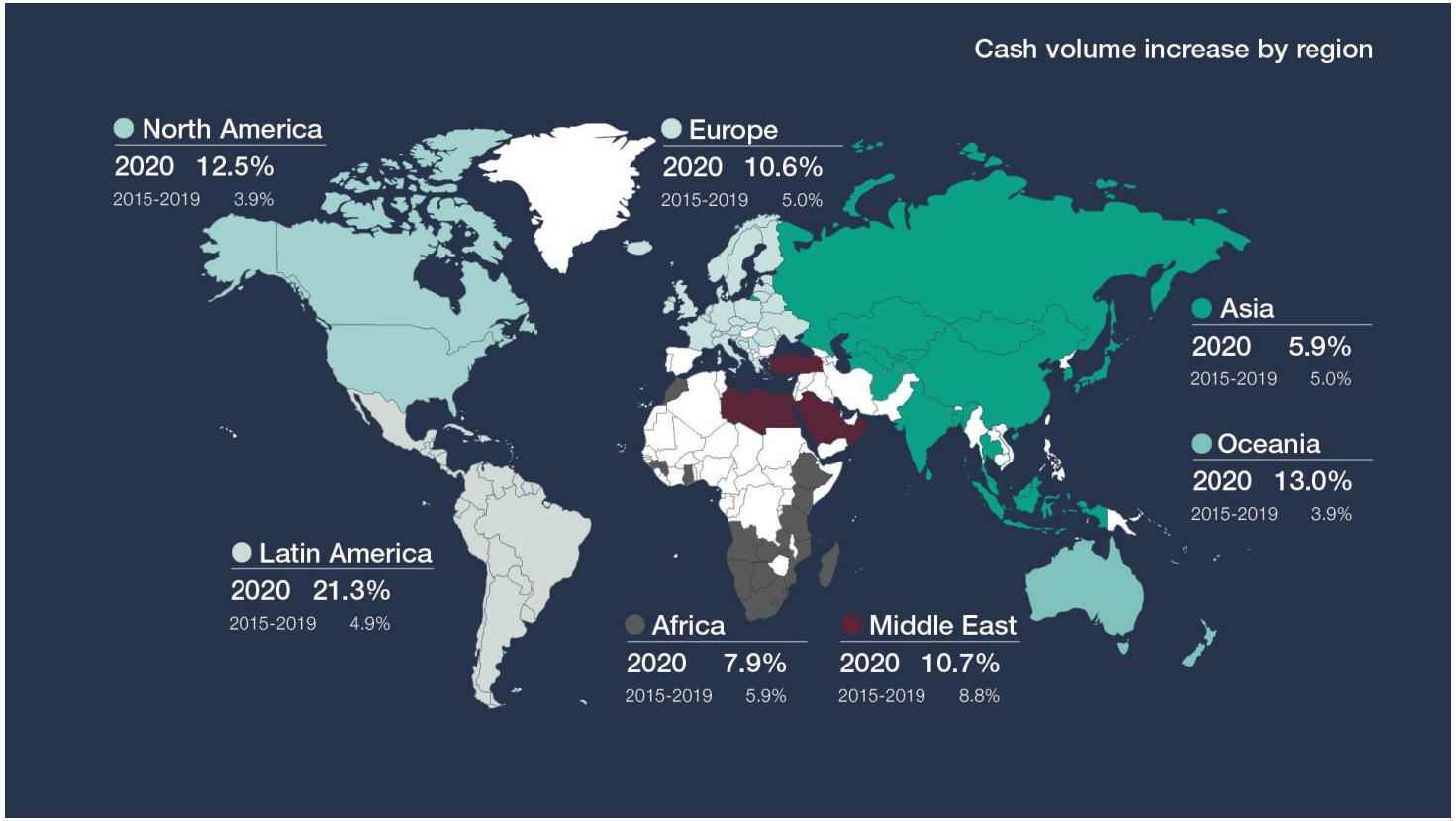
The banknote printing industry growth



- Rise of the volume of cash in circulation, despite digital payments
- Clean banknotes policies, replace unfitted banknotes
- Measures against counterfeiting, Growing variety in banknote security features and increasing complexity in banknote design

Source: www.delarue.com/thoughtleadership/volumeandvalueofcash
Banknote market size to grow at a CAGR 2.97% by 2027: Driven by the implementation of central bank policies for clean banknotes - Technavio

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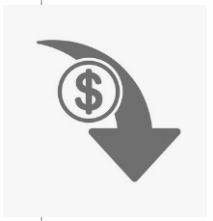
Operational challenges

Increasing competition



High demand for cost savings

Increase delivery speed & higher quality

New designs, new security features

Deal with existing Infrastucture

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How to face the operational challenges?

NEW state-of-the-art equipment

OR

ENHANCE existing infrastructure:

- Upgrade and integrate advanced inspection solutions

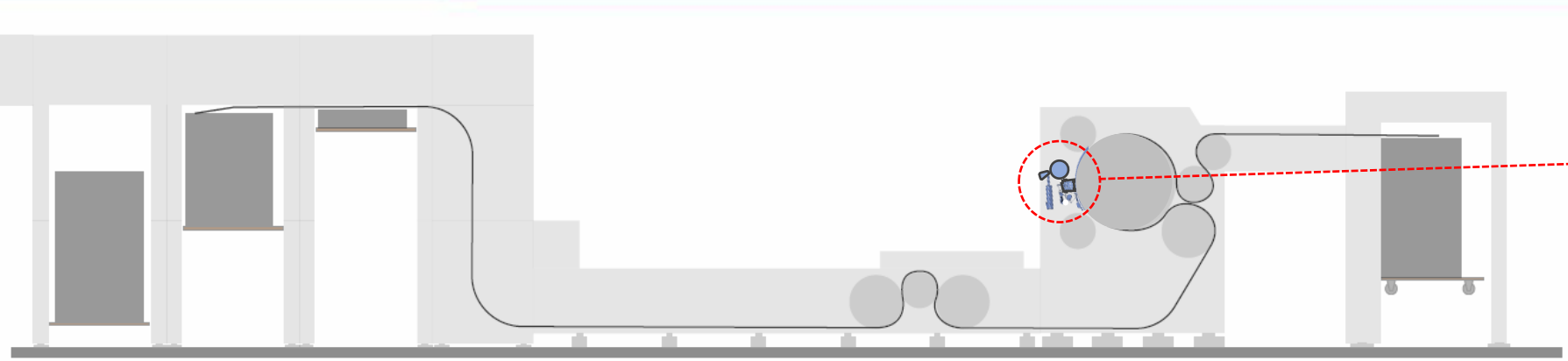
Case studies of integrating advanced inspection solutions

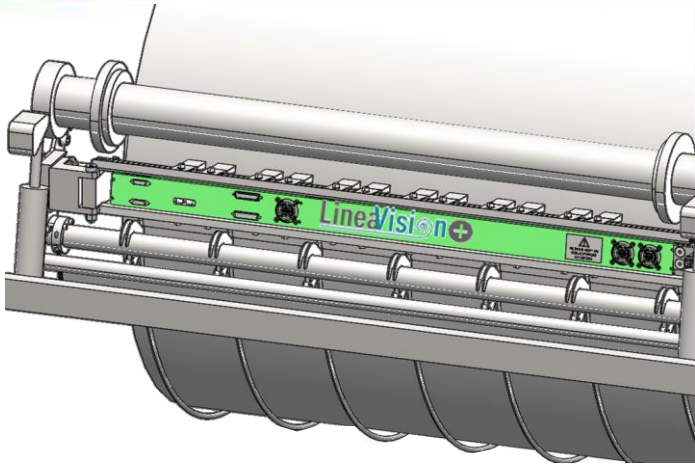
1. Case 1: ADD in-line inspection system into existing screen-printing machine
2. Case 2: REPLACE in-line inspection system into existing intaglio printing machine
3. Case 3: ALTERNATIVE Off-line Smart Table equipment for offset single sheet conformity validation and quality checking

MECHANICAL CHALLENGES

- Without major modifications of the existing machine
- Fit in available space
- Sheet stability
- Simple mechanical integration
- Fast installation

Case1: ADD in-line inspection system into existing screen-printing machine





Compact solution with CIS sensor 300 DPI and IR light


Before

After


Maintenance operations

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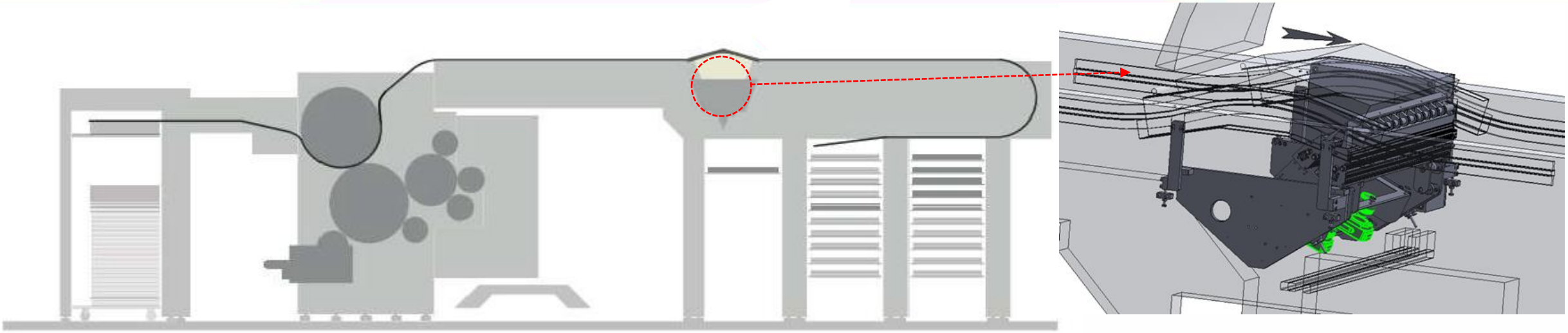
Case2: REPLACE in-line inspection system into existing intaglio-printing machine



Mechanical installation in the same location of previous vision system:

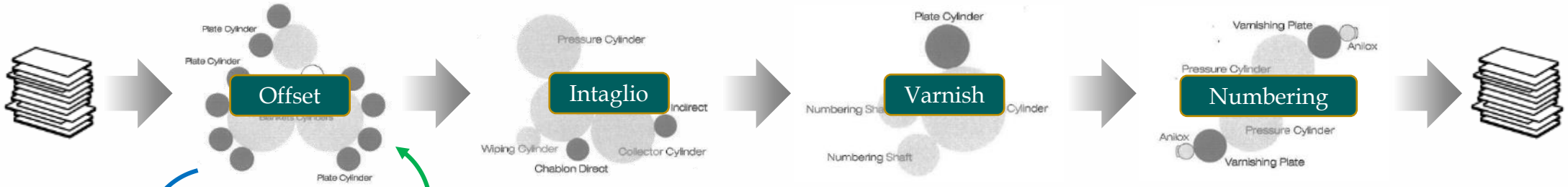
- Enough space
- Sheet stabilization system

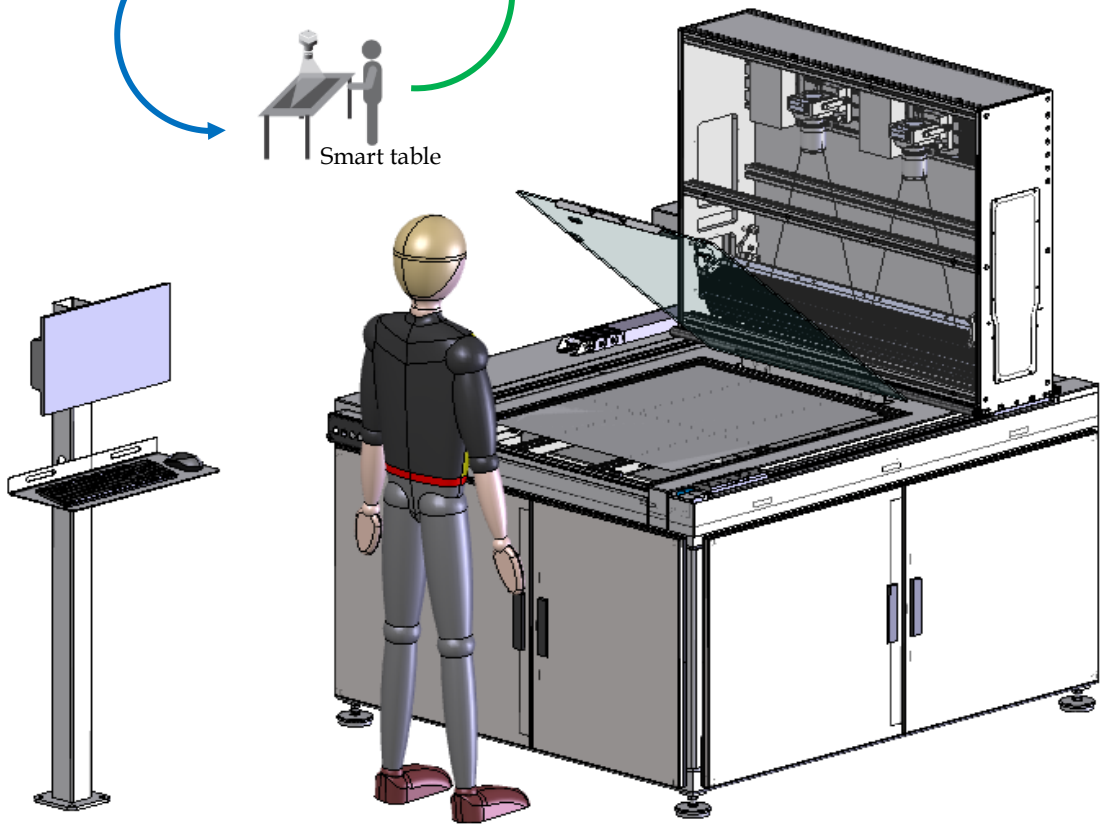
2 x Line-scan cameras, full R,G,B, IR inspection

- Registry control
- Defect detection

VALORA SEPRINTO improving together in-core systèmes

Case3: SMART TABLE :
Single sheet conformity validation and quality checking





Sheet is in fixed in glass plate

Automatic scan the entire sheet in about 15s

Multi-acquisition conditions

- Line-scan sensors (cameras and CIS)
- Color R,G,B & UV (IR optional) inspection with a resolution between 230 & 300 DPI

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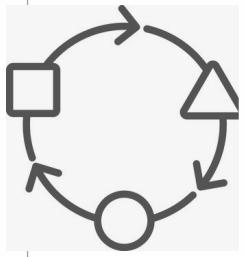
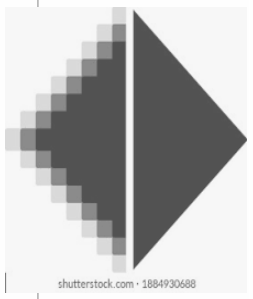
APPLICATION / PERFORMANCES CHALLENGES



FLEXIBILITY

- To deal with multiple printing layers
- To control different security features
- To set up different quality settings for each feature



HIGH RESOLUTION

- Print to Print Register
- Print to Paper Register
- Dimensional control (positions, measurements, ….)
- Aspect control

REAL-TIME

- Reduce process variations
  - Reduce waste
  - Increase yield
  - Increase quality

DATA MANAGEMENT

- Quality data
  - Per single banknote
  - Per sheet
- Historical Data available for analytics and process improvement

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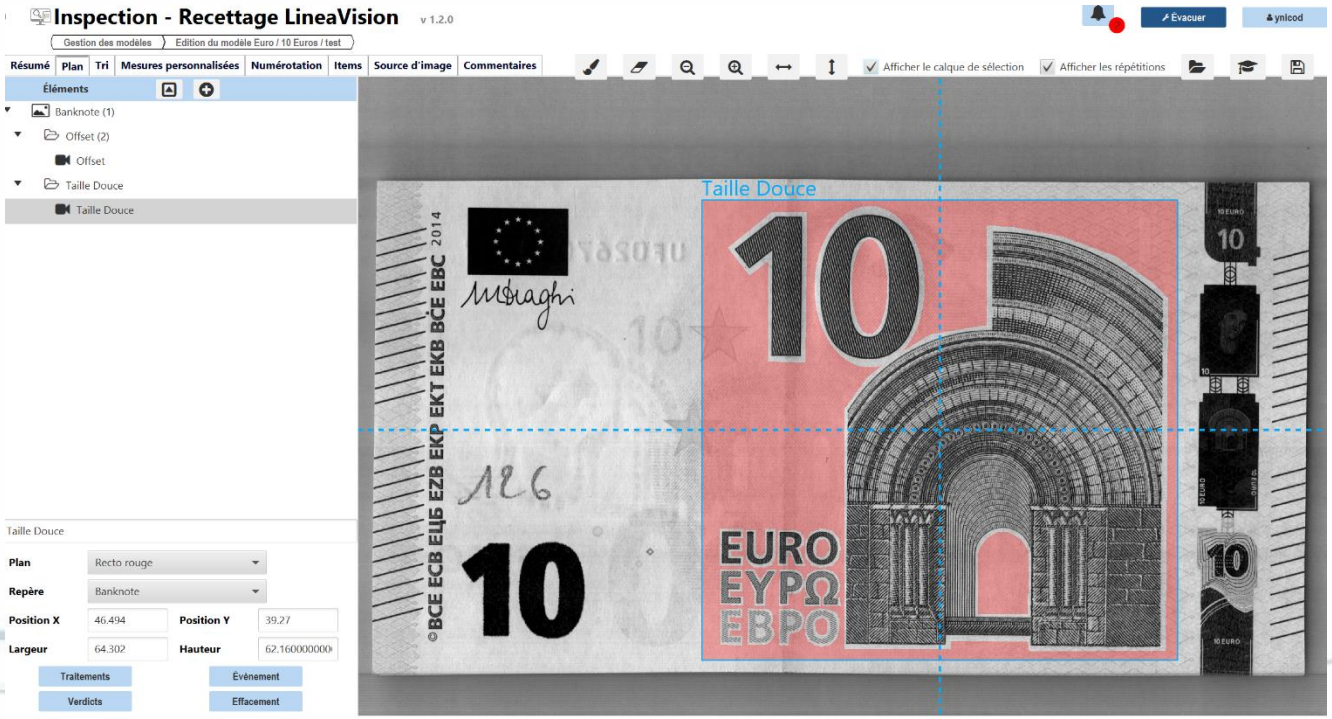
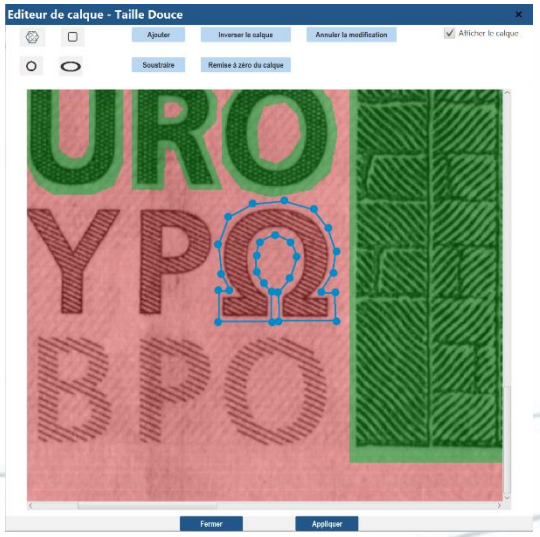
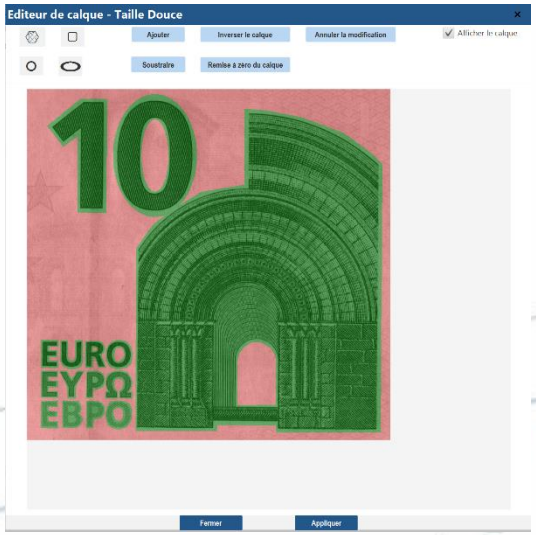
INSPECTION AND CONTROL

- Set up “the model” in which you define the nominal representation of the banknote
- Detection strategies per critical/uncritical area
- Useful tools to select shapes of areas to inspect

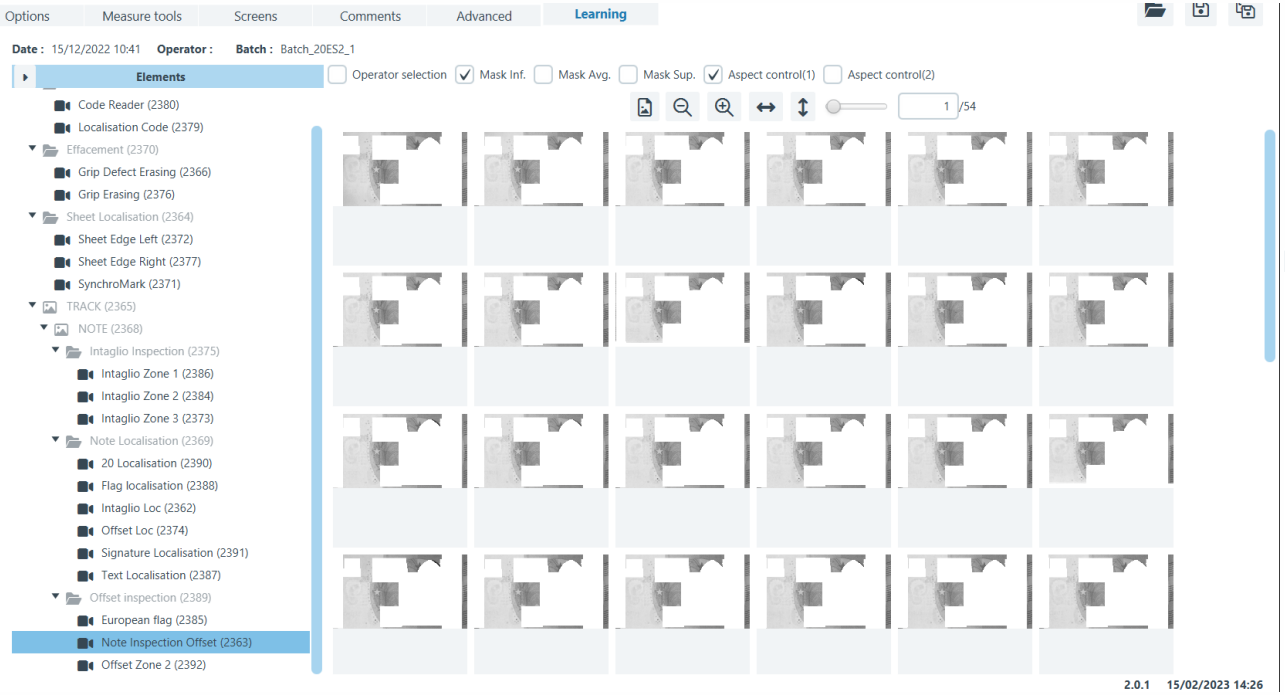






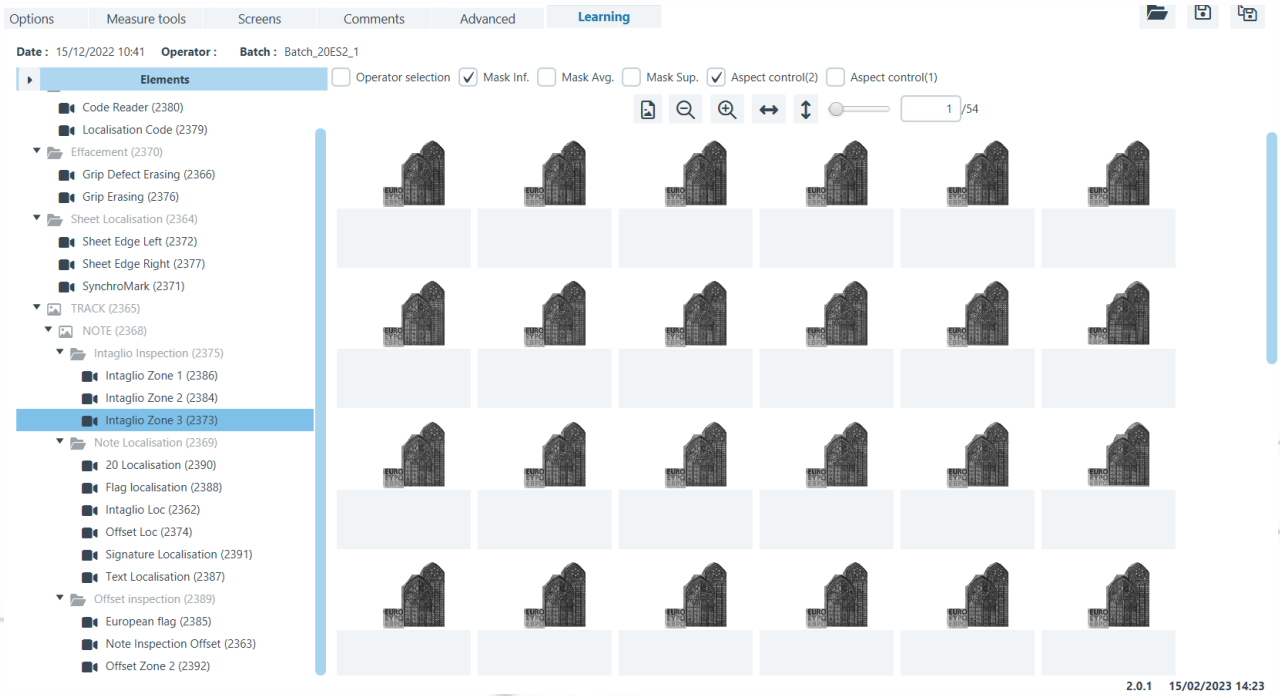
INSPECTION AND CONTROL

- Learning on nominal production to create “golden template”
- Golden template and masks for each area defined on the model
- During inspection, detection of variabilities outside accepted tolerances of the golden template



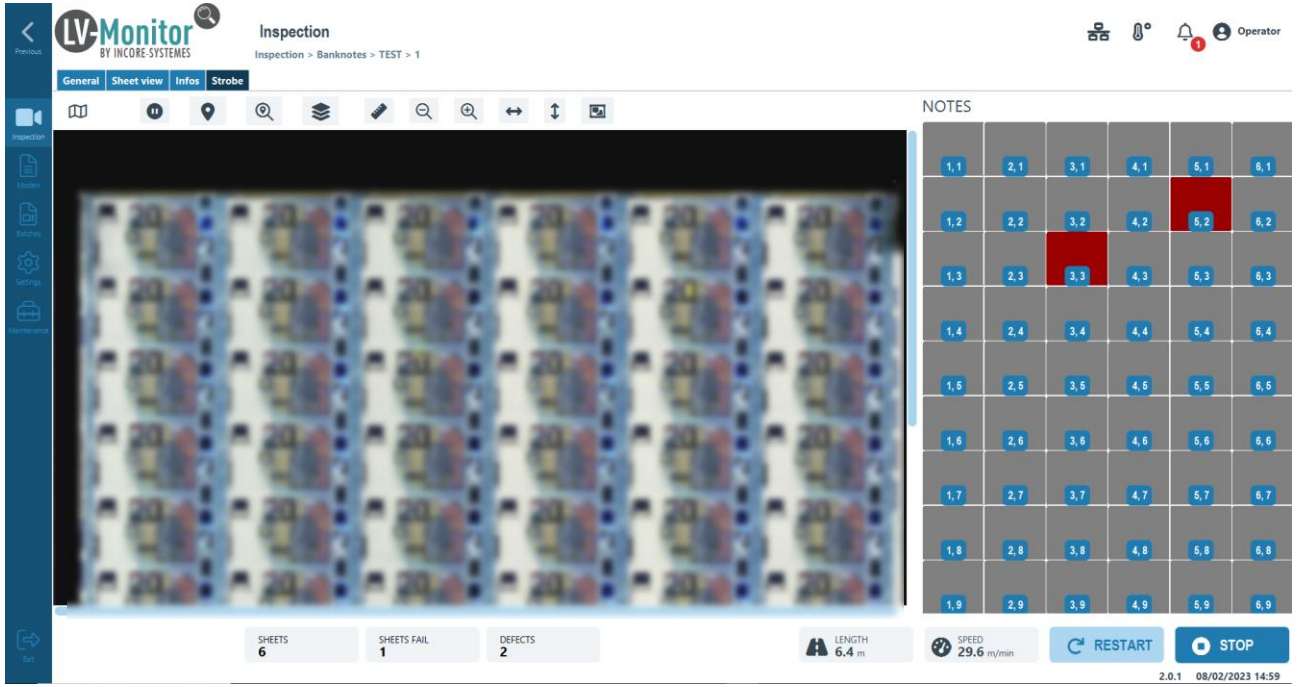
Example Golden template offset layer

Example: Golden template of intaglio zone

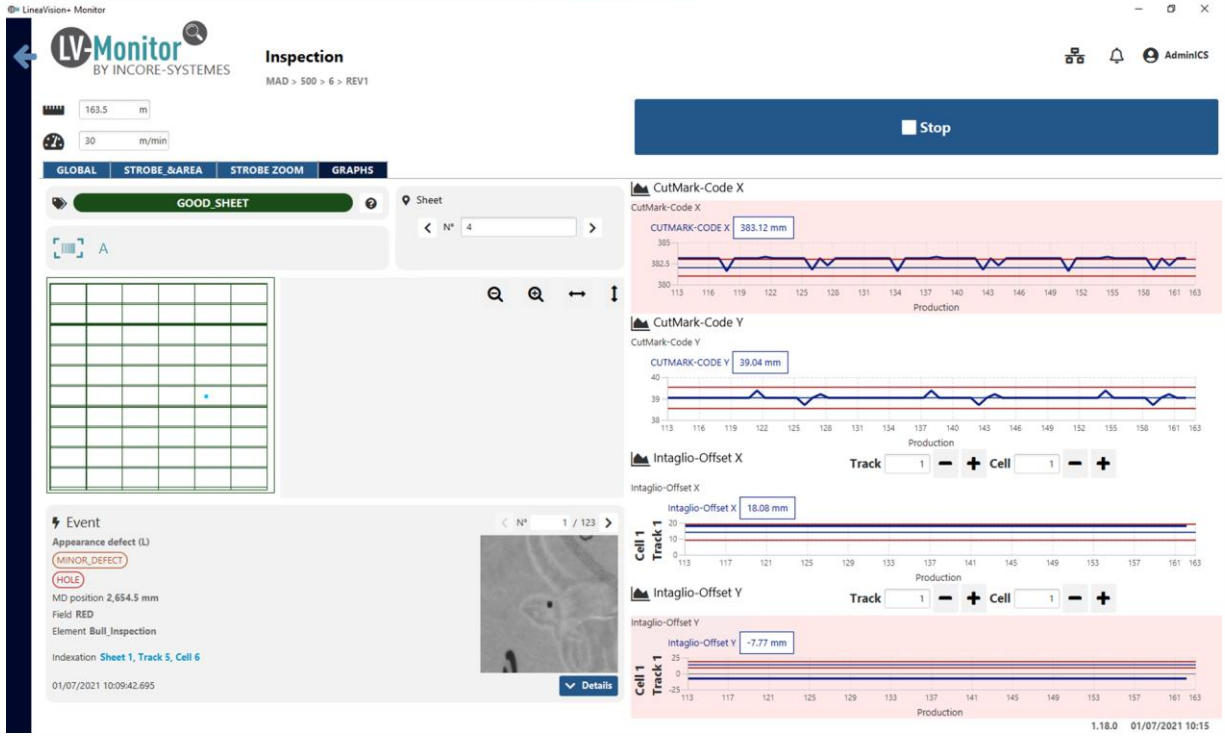


REAL TIME INFORMATION

- Real time information with useful information to alert operator of process drift.
- Multiple screens with configurable HMI
- Touchscreen

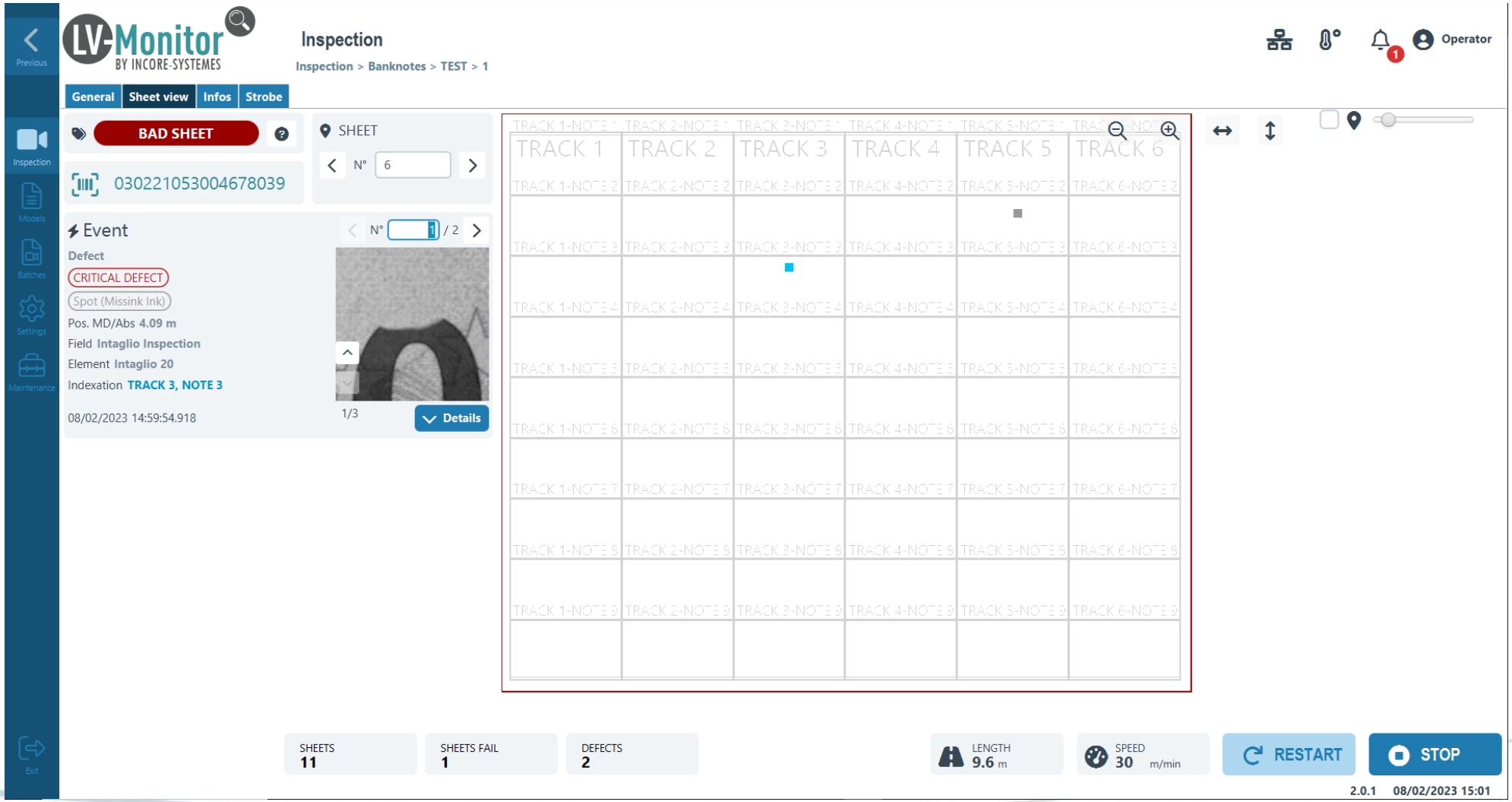


Dynamic Live image of product, zoom in/out.

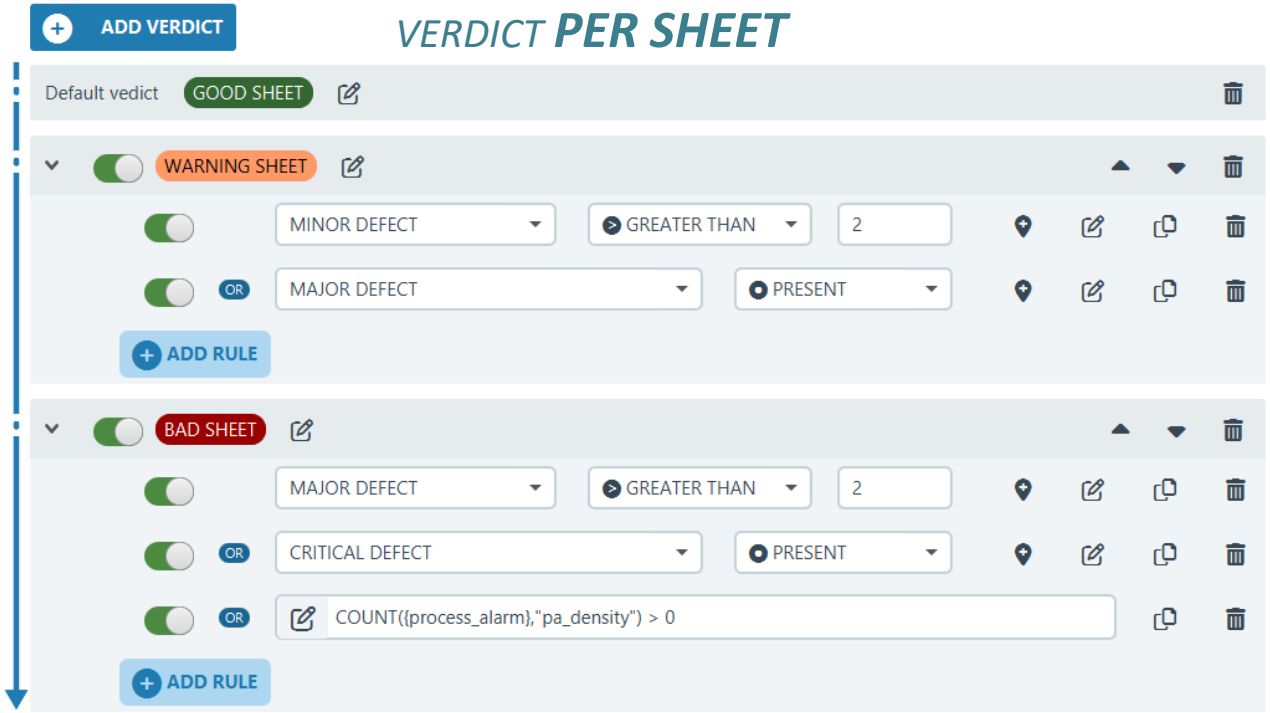


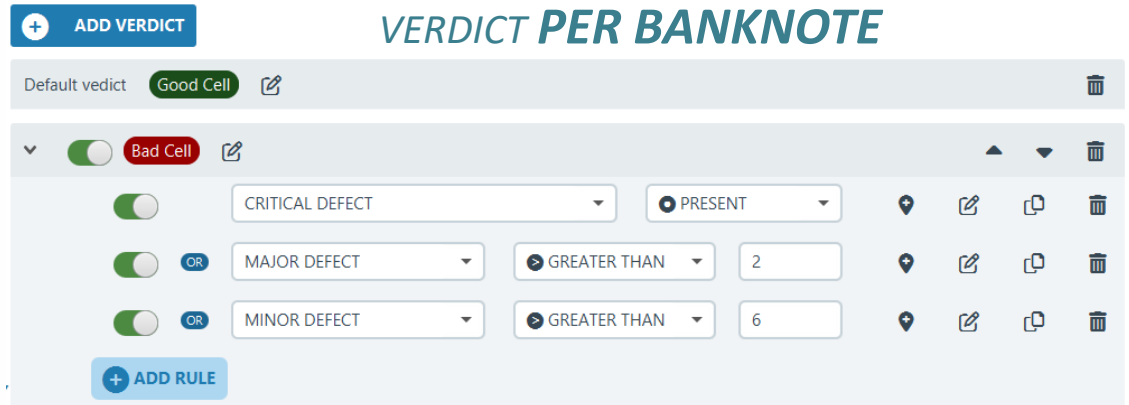
Graphs of registry control between layers

SHEET VIEW


LV-Monitor
BY INCORE-SYSTEMES
Inspection
Inspection > Banknotes > TEST > 1
Operator
Previous
Inspection
Models
Batches
Settings
Maintenance
Exit
General
Sheet view
Infos
Strobe
BAD SHEET
030221053004678039
SHEET
N° 6
Event
N° 1 / 2
Defect
CRITICAL DEFECT
Spot (Missink Ink)
Pos. MD/Abs 4.09 m
Field Intaglio Inspection
Element Intaglio 20
Indexation TRACK 3, NOTE 3
08/02/2023 14:59:54.918
1/3
Details
TRACK 1
TRACK 2
TRACK 3
TRACK 4
TRACK 5
TRACK 6
SHEETS 11
SHEETS FAIL 1
DEFECTS 2
LENGTH 9.6 m
SPEED 30 m/min
RESTART
STOP
2.0.1 08/02/2023 15:01

DEFECT AND QUALITY MANAGEMENT

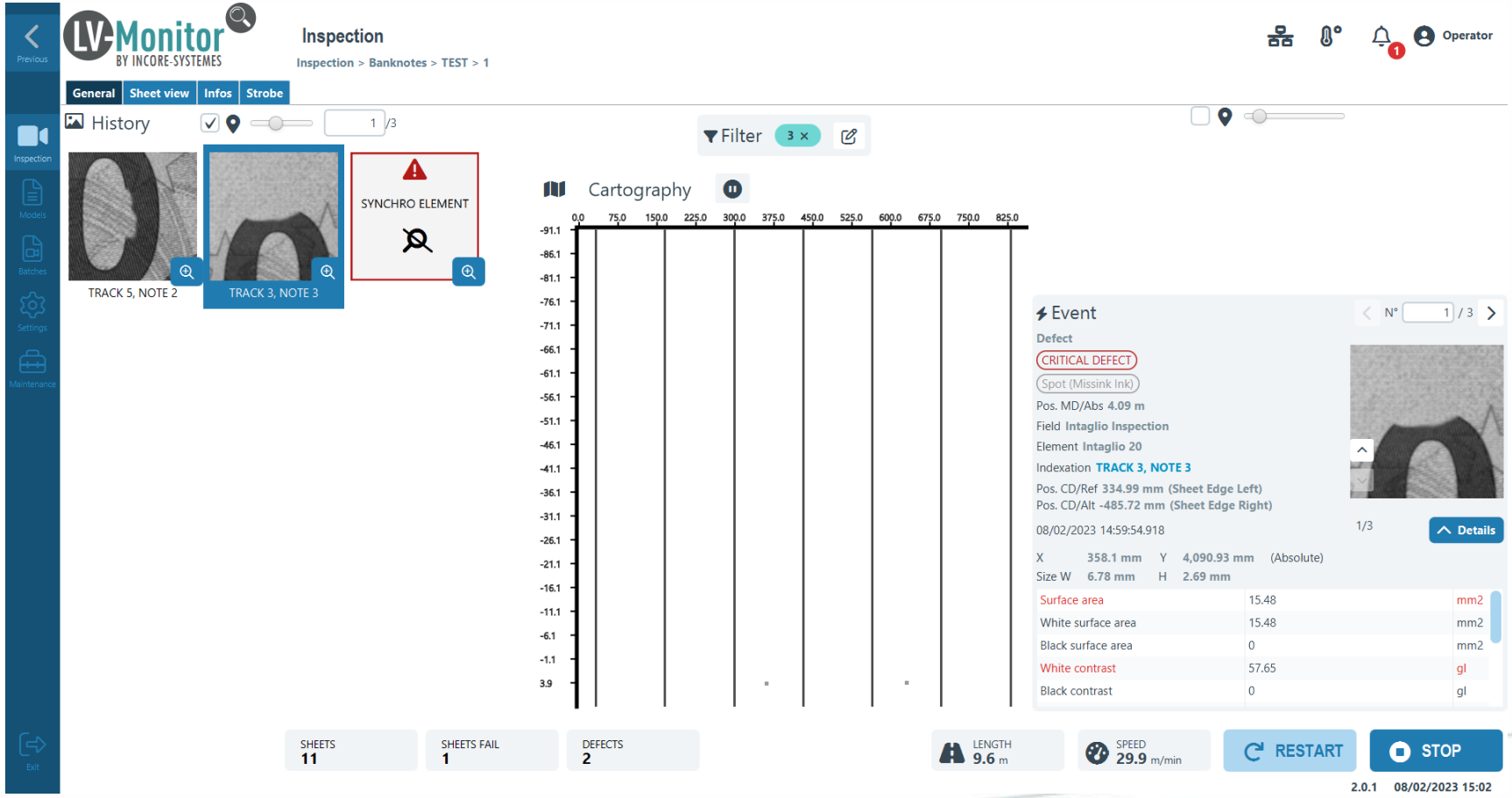




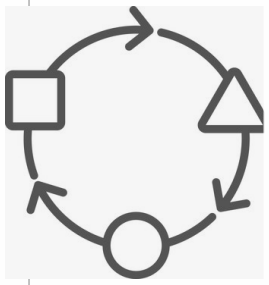
Each verdict trigger an I/O signal to drive different actions (defect or banknote marking, sheet ejection…).

HISTORICAL DATA AVAILABLE FOR ANALYTICS AND PROCESS IMPROVEMENT

- Report synthesis with detected defects, alarms, measurements
- Inspection statistics

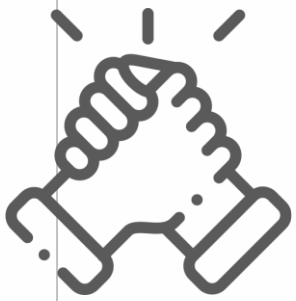


KEY TAKEAWAYS OF ADVANCED INSPECTION SOLUTIONS



COST SAVING & QUALITY

- Integrate in-line quality control into printing process to detect drifts as soon as possible
- High resolution system with powerful software tools
- Solution adapted with banknote complexity challenges
- Improve quality and Reduce waste



SUPPORT

- Remote support
- Maintenance
- Training
- Software evolutions
- Spare parts

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IN-CORE SYSTEMES – WHO WE ARE

Turn-key solutions

Advanced In-line quality control & traceability for the banknote manufacturing industry

Image configuration
Image acquisition
Real-time data processing
Real-time data broadcast

Core know-how

Full mastery of key technological components

Inhouse or long-term partners

SEPRINTO & PARTNERS

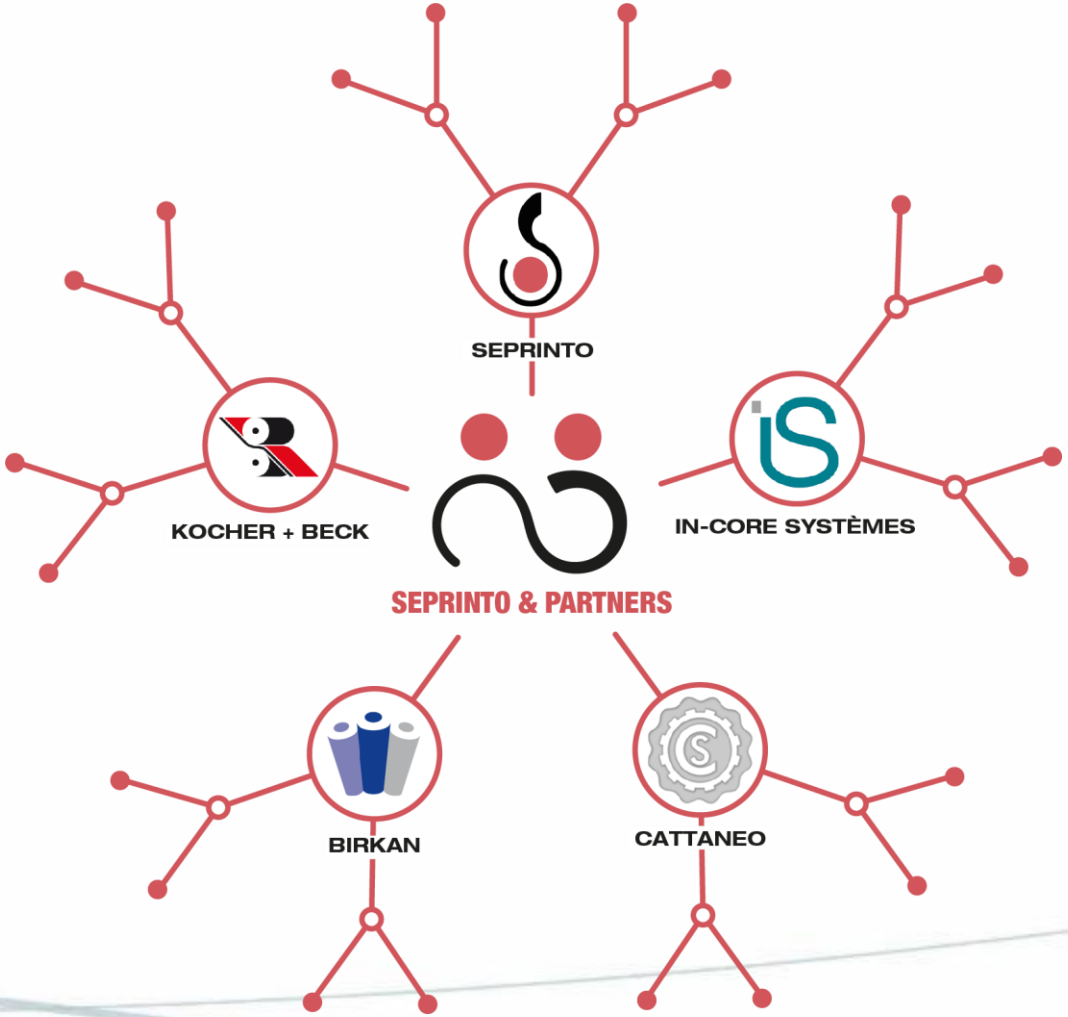
Providing innovations, improvements and cost savings by optimizing our clients' printing processes

LASERLINE SECURE

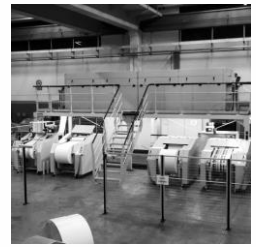
READY-TO-USE PASTE FOR WIPING CYLINDER

TRAINING AND CONSULTING

IN-LINE INSPECTION SYSTEMS

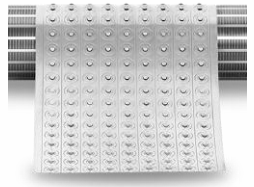


BLANKETS



WEB FED INTAGLIO PRESSES

ROTARY SCREENS FOR SECURITY INK



MICRO-EMBOSSING

THANK YOU FOR YOUR ATTENTION

SEPRINTO & PARTNERS
experts together

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