ACELABS
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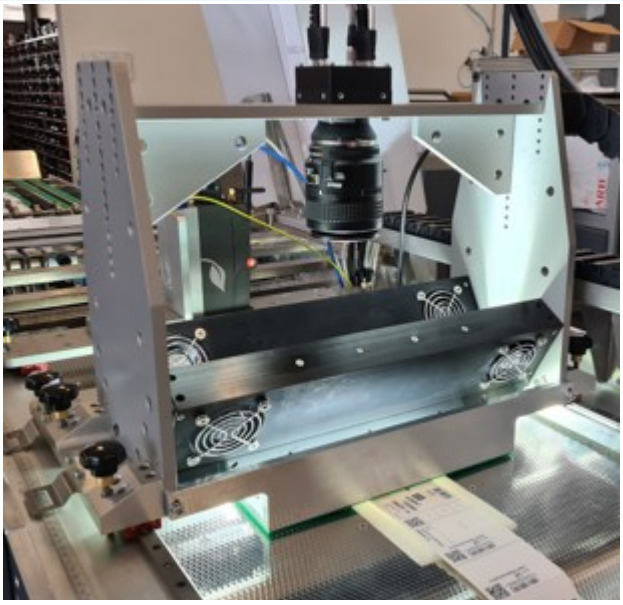
ALC

Vision System for Label Inspection

ACE LABEL CHECKER is an advanced machine vision system designed for the inspection of roll-fed labels, especially in high-volume applications with RFID chips. Its primary purpose is to verify in-line the print quality and the correctness of the printed/programmed data (texts, barcodes, QR codes, EPC, RFID) before the labels proceed to the next production phases or are shipped.



OPERATING PRINCIPLE

As the label web advances on the handling machine (e.g. TECNAU), the presence of the substrate is detected and the image acquisition station is activated. The line-scan camera with dedicated illuminators continuously captures the label image; upstream an antenna reads the RFID chips, downstream an ink-jet head automatically marks non-conforming labels. Everything is synchronized with the line encoder to ensure precise and consistent acquisition.

MAIN FEATURES

The **ACE LABEL CHECKER** combines multiple inspection technologies in one compact solution. While the labels move on the production line, every unit is scanned optically and checked electronically. The system analyses the graphic appearance and data integrity of each label and verifies that the RFID chip contains the correct information before the roll is cut or shipped

This integrated approach provides:

- Real-time inspection
- Dual verification of data
- Automatic scrap marking
- Tin inclusions
- Visual feedback for the operator
- Flexible handling of different products
- Consistent performance on large volumes

TECHNICAL CHARACTERISTICS

ACE-LABEL CHECKER is delivered as a complete, ready-to-install inspection module that integrates all the necessary hardware for high-precision label inspection. The system is composed of:

- High-resolution line-scan camera
- Dual LED illumination
- RFID reader plate
- Ink-jet marking head
- Operator console
- Secondary display

SOFTWARE FEATURES

At the heart of **ACE LABEL CHECKER** are two proprietary applications that work together to deliver a complete inspection process.

AceLabelConfig is the preparation tool. It allows the operator to import the original PDF artwork, define the inspection areas (images, texts, barcodes, QR codes, “no-care” zones), set rotation angles and inspection parameters, and then create the “recipe” and the “control file” that contain all the reference data. A built-in classification of “Found”/“Not found” data highlights missing elements so they can be corrected before inspection begins. This dramatically reduces setup time and ensures that the inspection will run with the right parameters from the start.

AceLabelChecker is the runtime engine. It loads the production data from Excel, the recipes and the control files, starts acquisition and continuously compares each real label to the ideal reference. Its intuitive dashboard shows the live camera image, the inspection areas, the status of all connected devices (camera, IO/encoder, RFID reader, machine), and the counters of the product being inspected. Reports are generated automatically at the end of each batch, with two Excel files summarising individual label results (including RFID/QR/Barcode readings) and production quantities (highlighting missing labels per SKU).

MAIN FEATURES

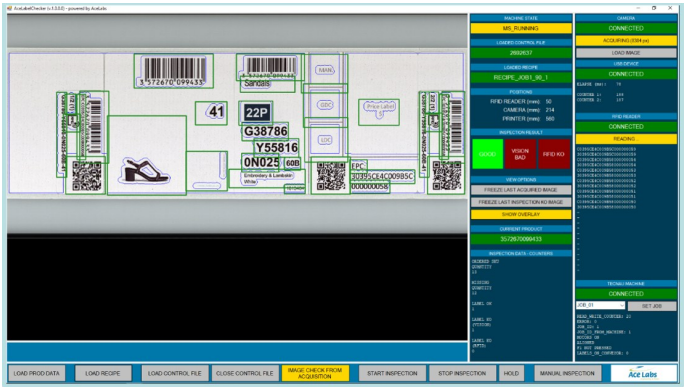
DETECTED DEFECTS AND LIMITS

ACE LABEL CHECKER has been engineered to identify with high reliability both print-related and data-related non-conformities on roll-fed labels. Using its high-resolution line-scan camera and dual illumination, the system analyses every millimetre of the label surface and every data element associated with it. It detects graphic defects such as missing or shifted elements, colour mismatches, smears, misregistration and damage to printed logos or text areas while simultaneously checking code integrity by decoding barcodes and QR codes and comparing them with the electronic data expected for each SKU.

The RFID reader verifies the presence and programming of the chip, detecting absent or unprogrammed tags, duplicated EPCs and any mismatch between RFID content and printed identifiers. By continuously cross-referencing the inspection results with the production file the system is also able to highlight missing labels within an order or changes in the expected SKU sequence.

Detection capabilities are governed by the system's optical and electronic configuration. In its standard setup the multi-thousand-pixel line-scan camera provides a sub-millimetre optical resolution of 1000 DPI, allowing the detection of very small defects such as print gaps, smudges or tiny substrate chips. Defects in codes are flagged when even a single module is missing or altered beyond tolerance based on the decoding confidence level set in the recipe. RFID verification checks for both presence and data integrity and mismatches between printed and electronic identifiers are immediately signalled.

For wider label webs or higher speeds the camera and lighting configuration can be adapted by changing lenses, adding cameras or using higher-resolution sensors to maintain the same detection thresholds. In this way **ACE LABEL CHECKER** can reliably detect minute print or data errors while running at full production speed, with actual detection limits depending on the chosen camera resolution, field of view and label format, all of which can be configured to match the customer's specific requirements.



INTEGRATION AND INSTALLATION

ACE LABEL CHECKER is delivered as a pre-assembled inspection module with camera, dual illumination, RFID reader, ink-jet marking head and industrial PC already wired inside a robust cabinet. This all-in-one design allows the system to be mounted directly onto roll-to-stack machines such as TECNAU and connected to existing PLCs for synchronisation, start/stop and defect signalling. The inspection head and RFID antenna are mounted on linear guides so their position can be quickly adjusted to match different label widths or chip positions without tools.

The integrated electrical cabinet houses the control units and power supplies for all components, with industrial connectors on the exterior to simplify cabling and reduce installation time. Cabinet sizes and mounting frames can be customised to suit the available space and conveyor width, and additional cameras or lighting units can be added if higher resolution or wider coverage is needed. Once installed, only a brief commissioning is required to connect encoder and trigger signals, calibrate the field of view and load recipes, allowing rapid integration into existing production lines while maintaining the stability needed for high-speed inspection.

OPTIONAL FEATURES

On request the system can be extended with:

- **Image and inspection** data logging for full traceability
- **Remote diagnostic** interface for service support
- **Advanced reporting** and batch management
- **Defect-based** sorting/rejection logic connected to actuators or stackers

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