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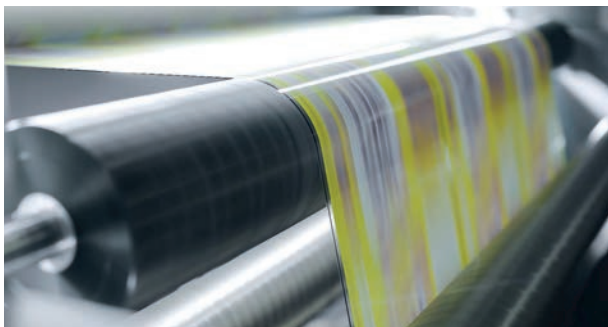
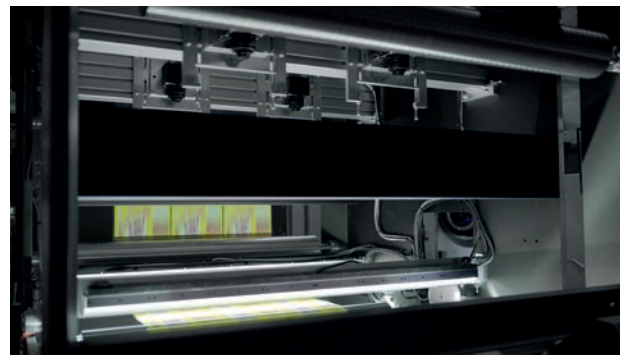
More sustainability, fewer misprints

Innovative vision system for print inspection and color measurement

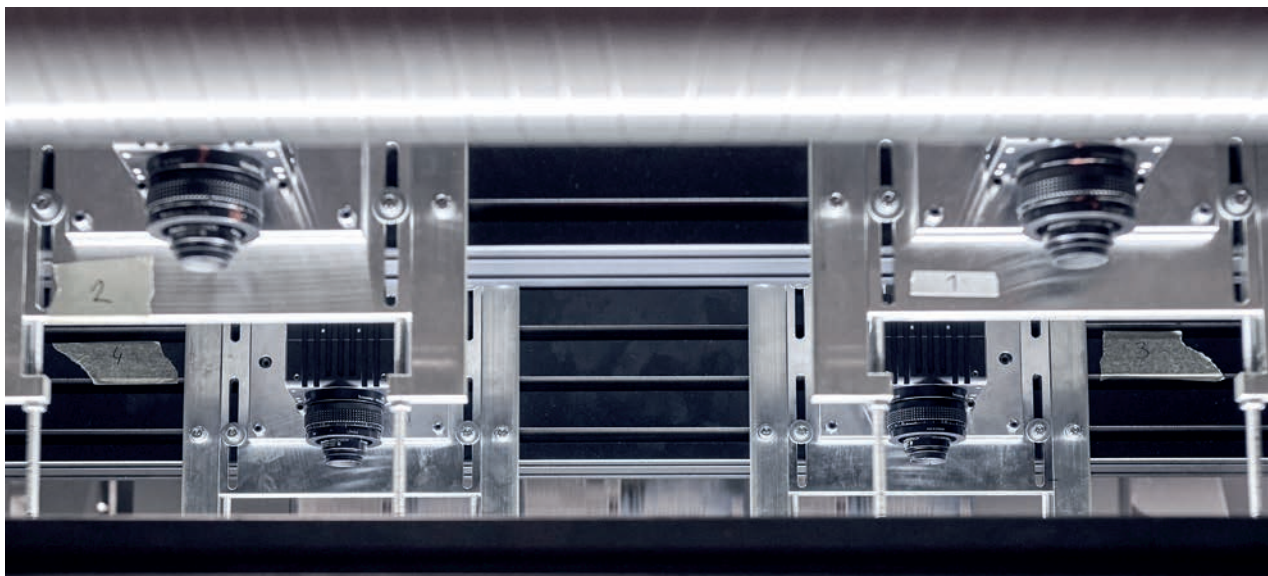
The printing industry faces the challenge of delivering the highest print quality while reducing waste and optimizing production processes to achieve greater sustainability. To meet these requirements, CCL Label, a printing expert specializing in printing on shrink sleeves, has developed an innovative inspection system in collaboration with Virona GmbH and Chromasens GmbH that detects errors at an early stage and ensures consistently high quality. By using four allPIXA evo 8k color line scan cameras from Chromasens, both color measurement and print inspection are performed inline.

True-color and error-free foil labels

At CCL Label in Dornbirn, Austria, various flexible film labels are printed on several printing lines. The sleeves serve as labels for round or oval containers (such as bottles and flacons) and offer all-round decoration in brilliant print quality. In addition, product and consumer information and, where applicable, danger warnings are printed on the label. The very thin transparent film is first printed using web offset and gravure printing processes and then processed directly in the production facility into cylindrical sleeves.



CCL Label has set itself the ambitious goal of significantly reducing waste rates in packaging printing and optimizing the setup of print jobs. These measures not only save material, time, energy, and costs, but also make an important contribution to the environment. The challenge was to develop an inspection system that could not only detect typical printing defects, but also provide inline color measurement across the full print image, as traditional color control elements cannot be used on sleeves.



A customized solution for print inspection and color measurement

Working in close cooperation, Virona and Chromasens have developed a system for CCL Label that enables precise print inspection and color measurement tailored to the complex requirements of modern printing processes. It consists of two camera systems that use identical cameras and lenses but differ in terms of their lighting arrangement.

For inline color measurement, Virona and Chromasens developed the innovative VInspect color measurement system, which is based on high-speed color line scan cameras from Chromasens. The completely newly developed system is capable of measuring color values in the printed image inline. The color is measured across the entire print width for every point in the printed image, which is not possible with conventional color measurement systems. Homogeneous dark field illumination and a motorized cylinder with a neutral background enable reliable and traceable color measurement. This arrangement is based on a patented design by Chromasens.

The second camera system is used to detect printing errors and works with background lighting that has been specially optimized for transparent film material.

Both systems are housed one behind the other in a stable mechanical frame, which ensures precise alignment of the two camera systems, including lighting and guidance of the film web. In each system, two allPIXA evo line scan cameras with an

industrial-grade CXP interface and 8k resolution together cover a web width of 1060 mm. Both systems have a resolution of 300 dpi to detect even the smallest defects. Three color lines ensure high color resolution and stable color values. High line rates of up to 100 kHz enable the inspection of 5 meters of foil printing per second.



To ensure consistent resolution in the transport direction even at varying web speeds, the camera regulates the line frequency based on the current web speed. This is measured using a rotary sensor and transmitted directly to the camera.



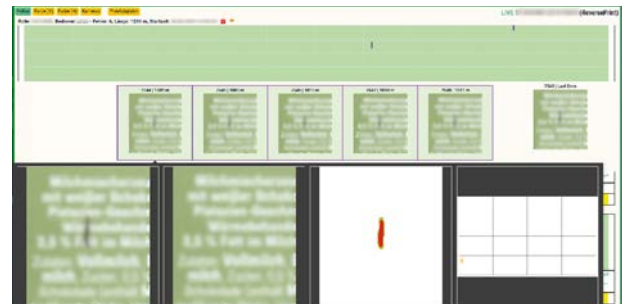
„The key to the solution lies in the calibration process, which allows us to achieve color measurement accuracy with a color deviation of $< \Delta E^{*}_{ab} 1.3$. This means that measurement with the spectral handheld measuring device can be replaced.“

Franz Brandl, Managing Director Virona GmbH

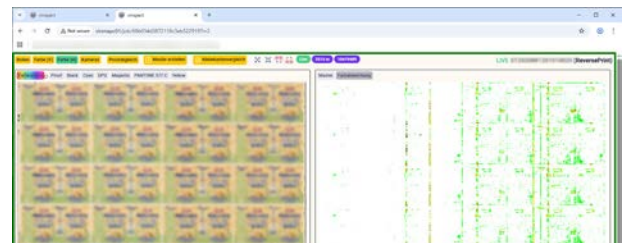
Detect errors, optimize printing, reduce waste

The tri-linear line scan cameras deliver RGB values, which are converted to CIELAB values in real time using the stored calibration data. This process requires very fast calculations based on precise color calibration of the entire system. The color calibration process for a web-fed printing press is another challenge. Using Chromasens' software and patented process, the calibration process for roll-to-roll printing has been adapted and a defined procedure ensured. This allows CCL Label to perform color calibration easily and reliably. The images captured are automatically evaluated, allowing even minor errors and color deviations to be detected during production. Printed areas with errors are highlighted and the color control parameters are adjusted according to the measured color value differences.

Precise color measurement and reliable defect detection can improve print quality and reduce the reject rate. The solution enables precise printed colors with color deviation $< \Delta E^{*}_{ab} 1.3$. Up to 50% less wastage leads to cost reduction and more sustainable production. Setup times when changing products are shortened. The higher efficiency also leads to a reduction in operating times and therefore fewer work shifts. Overall, the solution offers a wide range of benefits that improve print quality, efficiency, and sustainability.



Display of a print error in Vlnspect: Errors in the current print image (left) are detected by comparison with the reference image (center). Their occurrence in roll meters is precisely logged so that the defective area can be subsequently removed.



Vlnspect interface: Display of color deviation in the current print image (right) in relation to the reference (left). White: no color deviation. Green: slight color deviation. Yellow: color deviation within tolerance. Red: high color deviation, adjustment required.

Highlights

- ✓ High print quality with color deviation $< \Delta E^{*}_{ab} 1.3$
- ✓ Up to 50% less wastage
- ✓ Color measurement and print inspection in a single system with identical cameras
- ✓ allPIXA evo 8k color line scan cameras deliver high resolution and line rates
- ✓ Stable color measurement across the full field of view (1060 mm width)
- ✓ Continuous control and improvement of print quality