Basler Cameras Inspect Pill Packs at High Speed

Customer

- Manufacturer of pharmaceutical products with world-wide locations
- Requires machine certification according to the European Commission's Good Automated Manufacturing Practice Guide for Validation of Automated Systems version 4.0

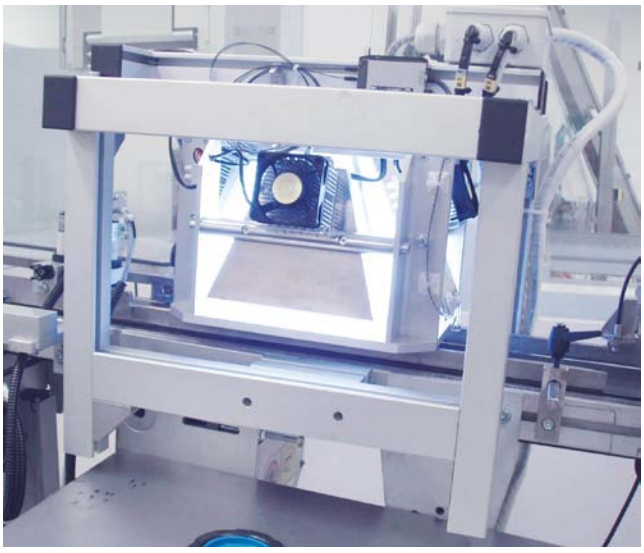
Application

The challenge was to build a machine vision system for automatic inspection of the inkjet printing on blister packs containing pills. The system must search for printing defects and smears and must cope with high inspection speeds of up to 120 packs per minute. The inspection system must be fully automatic with user-friendly configuration capabilities, must allow communication with the control PLC, and must provide inspection statistics.

Solution and Benefits

The solution was to create a fully-automatic vision inspection system with unique lighting and an integrated progressive scan camera to detect printing defects and smears within the printed information on a blister.

The system consists of custom lighting, optics, a Basler A311f high-speed digital FireWire (IEEE 1394) camera, and a control PC. The system checks for the presence and printing quality of labels, bar codes, lot numbers, expiration dates, and manufacturing codes printed on the blister cover's aluminum foil. The system is able to evaluate the quality of printed information according to the conditions defined by the operator during the setup process. Visual faults can be discovered in the pill's description (missing text, smears, etc.). The system throughput is up to 120 packs per minute with each pack containing 10 pills. Each pill cavity is marked with the text and graphical information mentioned above.



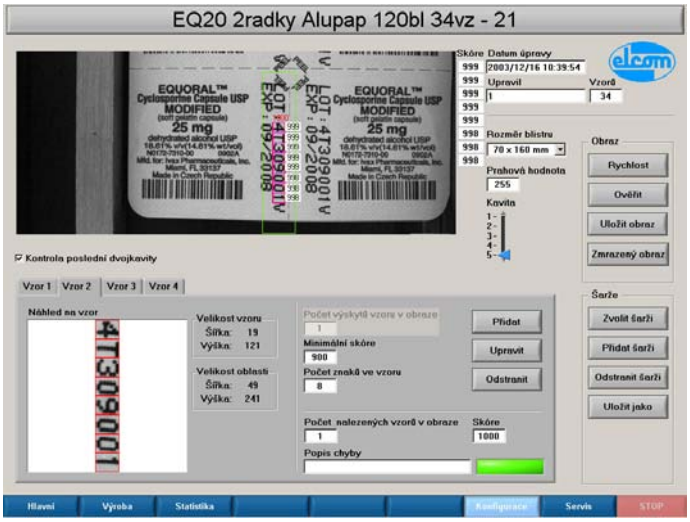
The vision system is placed above an existing conveyor. An inkjet printer prints the lot number, expiration date, manufacturing date, and other data (up to 4 lines per cavity) on the aluminum foil covering the pills. The control PC communicates with the control PLC through 32 input/output digital lines. The digital lines are powered from the PLC side (the power source is mounted on a DIN rail in the switchboard). A trigger coming from an optical sensor is connected directly to the camera to avoid signal delay. The camera is a Basler A311f with 658 (H) x 494 (V) pixel resolution and progressive scanning. The camera is connected via FireWire (IEEE 1394) to the control PC. The lens is a Schneider Kreuznach fixed focus. The scene is lighted by a unique LED panel cone, which provides homogenous light intensity over the whole blister. Because the metal foil tends to cause unpredictable reflections, the lighting conditions are critical. This problem is the most critical during startup of the blistering line, when the material temperature is not stable. The foil itself is a critical issue as well – it comes from various suppliers and the foil parameters vary.

The vision software application was developed in LabVIEW with the use of the NI Vision Development Module and NI Vision Acquisition Software. The inspection is mostly based on pattern-matching functions. The text printed by the inkjet is very unstable and therefore OCR could not be used. Due to blister deformation caused by temperature bending, the letters are different sizes and shapes over the blister area with extremes on both the end and the middle cavity pairs. The text to inspect is divided into small areas with each area inspected separately. This method ensures high resolution and inspection repeatability. Thanks to the high quality of the Basler A311f camera image output and the pattern matching algorithm in the NI Vision Development Module for LabVIEW, the vision system is capable of discovering not only missing or faulty text but also smears and splotches. It is obvious that system throughput depends on the number of inspection parameters and on the size of the inspected area. The system was designed to inspect up to four lines of text and to search for smears in two to four areas on each cavity at a maximum rate of 120 packs per minute.

The software application offers a wide range of user-configurable parameters. Each system setup is stored and can be recalled later or used as a base for a new configuration. The system makes statistical calculations and evaluations. The application has password-protected operator/administrator access. All operator actions are logged to a file for future reference.

The vision system (both hardware and software) was validated by a company using the European Commission's Good Automated Manufacturing Practice Guide for Validation of Automated Systems version 4.0

Based on Basler's A311f IEEE-1394 camera, National Instruments' LabVIEW with Vision Development Module, and National Instruments' DAQ device, the vision system delivered by ELCOM, a.s., DVI allows the end user to meet high quality standards and to discover malfunctions in production at a very early stage. The line downtime and the possibility that a faulty product will be distributed to customers are both minimized. End users can easily modify the inspection parameters as production require-ments change. A user-friendly configuration interface developed in LabVIEW makes configuration simple and straightforward. Thanks to seamless integration of Basler cameras and National Instruments flexible software and hardware tools, machine vision systems are easy to design and maintain.



Technologies Used

- Basler A311f camera
- National Instruments LabVIEW™ with NI Vision Development Module and NI Vision Acquisition Software (IEEE 1394, GigE, and analog camera drivers)
- Industrial grade PC with an MS Windows 2000™ OS

More Information

http://www.elcom.cz/en/virtual-instrumentation

Basler's A311f camera

Basler AG
Germany, Headquarters
Tel. +49 4102 463 500
Fax +49 4102 463 599
bc.sales.europe@baslerweb.com
www.baslerweb.com

USA
Tel. +1 610 280 0171
Fax +1 610 280 7608
bc.sales.usa@baslerweb.com

Asia
Tel. +65 6425 0472
Fax +65 6425 0473
bc.sales.asia@baslerweb.com