

SECURITY PRINTING

Erwin Wagner explores what makes security printing so different from conventional printing and looks at recent innovations in machines, ink, substrates and digital systems designed to protect against counterfeiting threats



Erwin Wagner, Global Sales Manager for Security Print, Baldwin Vision Systems

The ongoing challenge in the world of security print is to continually innovate by developing techniques for producing currency, passports, tax stamps and other secure documents that thwart increasingly sophisticated counterfeiters with the technology at their fingertips to easily reproduce them.

Ever-advancing development has led to state-of-the-art, optically variable devices and inks, fibres, threads, taggants, micro and nanotechnologies... and the next big thing that breaks the boundaries of printing, processing and finishing equipment.

WHAT DIFFERENTIATES SECURITY PRINT?

There are several different aspects that differentiate security print from the many other types such as newspapers, magazines, packaging and labels. It starts with the substrate to which the print will be applied, which is significantly more complex and already includes security features, such as watermarks, coloured and fluorescent fibres, holographic foils, embedded and surfacing security threads. Many countries have even converted to different substrates such as polymer or hybrid substrates with very intricate layering. Security substrates are usually UV light absorbing, also often referred to as UV dead.

The next difference is that conventional printed products are usually printed on just one printing machine or line. Security products have multiple processes applied on various printing and/or processing machines.

The substrate may first be processed on

a Simultan offset press printing both sides at the same time in full registration, then a screen-printing press, and then run through a patch application process, hot or cold foil

"There are security features so protected and secretive that often not even the printers are aware of their properties or even their existence"

application or a stamping machine. An embossing process may be added, and the product could be processed through an intaglio printing press and then through a press printing the serial numbers and/or barcodes on the product. It may also receive a varnish coating before heading to finishing.

Another difference is the inks used for security printing are only available to security printers and have various types of unique overt and covert properties. Examples are optically variable, magnetic, visible and invisible luminescent, laser-activated, ink sensitive or reactive to different chemicals, thermo chromatic, photo chromatic, penetration bleed-through and tamper-proof inks.

"In addition to camera systems for retrofitting onto their existing presses, customers began expressing interest in complete standalone solutions"

These are level-one and level-two security features. There are also level-three and level-four security features that are so protected and secretive that often not even the printers working on the press applying them are aware of their properties or even their existence. High-security print includes products with a larger number of security features. Examples include bank notes, passports and revenue tax stamps or products that require intaglio presses and other equipment only available to certified security printers.

A LOOK BACK

My first experience with security print was in the early 1990s as a support engineer for a company that manufactured check-numbering machines. It also had a division that manufactured camera-based inspection and verification systems for serial numbers and barcodes that was one of the first entities manufacturing inspection systems for security print, or basically any type of print, in the mid-1970s.

When I first got involved with these

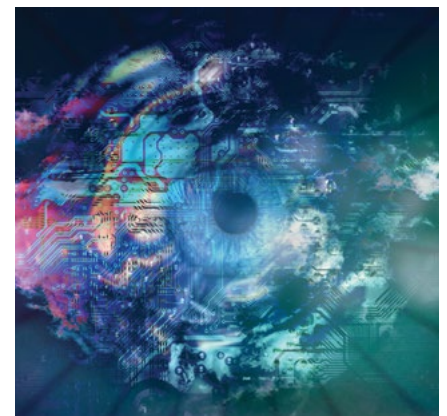
systems, everything was very proprietary – including the cameras, circuit boards, cables, the lighting systems, almost everything except for a few components were

manufactured in-house. Only the trigger sensors, camera lenses and the halogen light bulbs, for the lighting systems, were purchased from third-party vendors. We were providing these quality-control systems to security printers around the world and it was a challenge to further develop them and add functions within any reasonable time frame.

Supporting these systems also led me into getting involved in developing the systems further and helping transition them to a computer-based and Windows OS platform. That was when computers finally started to have sufficient resources, providing the architecture and the processing power required for the very complex image processing and

analysis on what we called High-speed Number and Barcode Verification Systems.

In addition to the actual camera systems for retrofitting onto their existing presses, customers began expressing interest in complete standalone solutions. Being a machine-building company, we started to design and build these custom solutions with



Formed in 2018, Baldwin Vision Systems designs and manufactures some of the security print industry's most advanced and customised inspection and verification solutions.

an added value by integrating the process that was required by our customer to produce their own product.

Several years later, two of my colleagues and I acquired the company's inspection camera division. For 10 years, we continued to provide inspection solutions, as well as standalone solutions with new partner companies that provided transport or other special equipment until we merged our company with PC Industries in 2017.

In 2018, Baldwin Technology Co. Inc. united PC Industries, and two other industry leaders it had acquired, QuadTech and Web Printing Controls, formed the new Vision Systems business unit, which designs and manufactures some of the security print industry's most advanced and customised inspection and verification solutions. These include retrofit inspection products as well as complete inspection, print and defect management, production lines for bank notes, tax stamps and other high-security documents and materials.

STEADY INNOVATION

One of the major changes over the past 10 years is the acceptance of digital print in security printing. To get serial numbering and/or barcoding, for example, this process was always performed using impact, or

crash, printing. This required complex, high-precision mechanical or electronic numbering machines that were also quite costly.

Sheets of 5 x 10 bank notes, as an example, require 100 (two per banknote) of these numbering machines mounted on printing cylinders, on dedicated printing presses. Other products, such as revenue tax stamp sheets, with as many as 600-plus stamps per sheet, make it highly uneconomical, as well as physically impossible, to print a serial number or barcode (or both) on each stamp, using this process.

Drop-on-demand inkjet printing systems started to be used and accepted in security print and they were sometimes the only option. Development of UV and IR fluorescent inks, inks with magnetic particles and laser-activated inks have accelerated the use of this technology in security print.

Other significant advances have been made with optically variable devices and inks and new security threads and stripes that are difficult to counterfeit, like the windowed stripe on the newest series US \$100 bill. The optical effect is also referred to as 'motion' since the pattern on the stripe moves when the note is tilted in different directions.

The transition from banknote paper, that has traditionally been a blend of cotton and linen fibres to synthetic polymer banknotes is

another significant advance. In 1988, Australia was the only country that issued polymer notes and today there are 27 countries, including Canada and Mexico, that issue notes using this substrate. Even though it costs around twice as much to produce these polymer notes, they end up being more economical because they last about three times as long as 'paper' notes.

Companies in this industry are constantly advancing requirements of security print techniques so it requires companies like ours to continually improve and develop our solutions to meet their needs and to help stay ahead of counterfeiting threats in the broad market.

There are teams out there in this industry that I am sure are working today on designing new highly secure elements that will go into banknotes that we won't see in circulation for three, four or more years. ■

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