New Security Printing Possibilities with Industrial Digital Presses

Jan Van Laethem
Manager Security Systems, dotrix nv
Gent, Belgium

Abstract

Industrial Digital Printing vs Brand Protection

Digital Colour Inkjet presses are available now as production devices in industrial printing environments. In this printing market, characterized by flexo and gravure presses, these devices answer the need for shorter runs, smaller turnaround times and reduced inventory costs.

By combining the digitally printed design with authentication features, which are to be digitally printed at the same time as the design itself, the opportunity is created to uniquely identify and consequently, trace the digitally printed matter. The Alpvision Cryptoglyph digital watermark presented in this paper is a perfect illustration of a non-obtrusive feature that has a good synergy with the digital printing.

Introduction

Printing in the world of today can be divided in two main categories. The first category is the production of all type of documents that are a product on their own. This includes all types of office documents, books, brochures, newspapers, magazines etc.

In the second category the printed matter serves to describe a certain good that it contains, as well as that it helps to promote the sale of a good. This category is characterized under the name of "industrial printing". Please note that there is no clear line between the two categories. For example, in the security printing field, the printed matter in question is clearly a document type. Yet in all of its production aspects (special substrates, specific inks, exotic printing techniques) security documents classify better as industrial printing.

In the digital printing world, until recently, all development effort went into the production of digital printing equipment that answer the need of the document printing industry. Only in recent years solutions and products emerged that find their way into industrial applications.

This paper describes the synergy that exists between the presence of digital presses for industrial applications, and the availability of anti counterfeiting and/or brand protection solutions that answer today's ever increasing need for certified authenticity.

The combined advantages of being able to produce industrial print matter digitally, and in the same production pass being able to include security features, leads to new considerations and business model to make industrial digital printing a worthwhile investment.

Digital Industrial Printing

Since the early 1990's, digital printing became popular as a way of producing colour documents. From the mid 1990's, one can say that true production colour printing also made its mark. Key players such as Indigo and Xeikon have made digital production of colour documents a reality of today. These – mostly toner-based – systems have made remarkable progress and are now in fact approaching a quality level that challenges the traditional offset printing.

On the industrial printing side meanwhile progress was decidedly slower. The extra demands in terms of substrate variety, ink properties and pre- and post finishing operations clearly were a much greater challenge to the industry. In the late nineties of the last century, beginning of the 21st century, it became quite apparent that toner based digital printing techniques would not be the best choice in an industrial printing world. The answer seems to be inkjet printing. This well-known technology saw technical breakthroughs in recent years that make its application in industrial printing environments now possible.

Digital Inkjet Printing & Dotrix

Dotrix, that emerged out of the Belgian Barco group, is a young (dec. 2001) company that concentrates itself on the development and marketing of industrial colour inkjet solutions. In this market, dotrix servers as an integrator company, using off-the-shelf industrial inkjet heads to combine them into a full colour printing installation. The key principle is the "SPICE" set-up. SPICE stands for Single Pass Inkjet Color Engine. This is a term that describes the essence of the system: the inkjet cartridges are mounted in a non-moving print rack, and the matter-to-beprinted-on is moved under this rack. The big advantages of this are a very high productivitiy for inkjet colour printing (more than 900 m_2 per hour. The inks used are UV curing inks, wet-on-wet printed at a resolution of 300dpi, 3bit grey scale. For more information, see www.dotrix.be

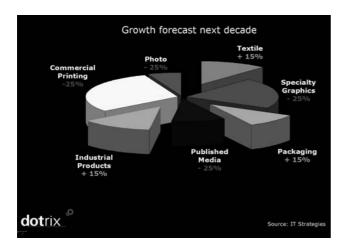## The Market for Industrial Colour Inkjet

Figure 1. Industrial Printing Markets: forecast next decade

The industrial printing market is perhaps the largest printing market overall. The applications range from the pure packaging applications (corrrugated cardboard, folding carton), via e.g. blister and foil packaging material to specialty or direct object printing.

Figure 1 shows a growth forecast of the different markets for the different submarkets. From this it is quite clear that the true potential lies in the industrial section.

The flexible market specifically, has grown by 33% over the last 5 years.

In the industrial market – as in any other prinitng market for that matter – there are some specific drivers towards digital printing: a search for minimal stock size, smaller print runs, and a constant effort to reduce delivery turnaround times.

The inkjet application technology that dotrix is presenting, provides good answers to the above questions. The combination of the physical properties of UV ink on the industry substrates with a high throughput make it possible to use the.factory in production environments that today use flexographic or gravure printing presses.

Anti-Counterfeiting Application – Digital Watermarking

The ability to track and trace the origin of goods, as well as being able to prove their authenticity, is becoming more and more important. The globalization of the economy (as well as terrorist threats) forces brand owners to invest heaviliy in protection schemes.

It is now possible to penetrate the traditional flexo and gravure printing with industiral digital printing alternatives. This also allows for the introduction of digitally printed anti-counterfeiting and/or brand protection measures, that can be printed digitally, along with the design itself.

Obviously, this has enormous advantages in terms of production costs, as the security features are printed without extra print or conversion stages.

The feature that is introduced here is a digital watermark type, as provided by dotrix partner Alpvision.

This company's feature "Cryptoglyph" is specifically suited for use in brand protection circumstances.

Specifics of the Alpvision Cryptoglyph Implementation

The Alpvision Cryptoglyph is a special kind of digital watermark. This watermark does not require the presence of a photograph or any other kind of bitmap picture to conceal the digital message into. Rather, the digital watermark is integrated almost invisbly with the existing design, by printing the information pattern using minute yellow dots. The dotrix SPICE technology is well suited to accomplish this beacause of its ability to modulate the printed dot size (grey scale printing).

When the.factory is printing the design, the security information contained in the digital watermark is printed at the same time. This makes it quite cost-effective to produce a protected package: there are no extra production stages required.

Figure 2. Digital printed package, containing watermark

Control and Verification

The Cryptoglyph is a covert feature – it can't be seen with the naked eye. The tiny yellow dots that contain the information payload need to be read by a scanning device and de-ciphered by dedicated software. This is an easy and quickly performed operation, that can be implemented in various manners, depending on the project's needs.

Conclusion

The combination of industrial digital colour printing with brand protection techniques offers distinct advantages:

- Digital printing answers the need for shorter runs;
- Digital printing answers the need for quick turnaround;
- It fulfills the neednswers to requirement to digitally print on industrial substrates;

- UV curing inks carry a list of distinct advantages for industrial applications;
- A digital watermark does not interfere with the brand images
- The Alpvision Cryptoglyph watermark does not require a bitmap image to embed its information;
- The SPICE digital inkjet printing technology is exceptionally capable of printing the Cryptoglyph because of its capability to control dot size.

Biography

Jan Van Laethem (1966) holds an engineering degree in electronics. He has been with Barco since 1989, where he started in software application development for CAD systems for the packaging design market. A few years later, Jan became involved in the development of a specific CAD system for the ceramics design market. Since 1993, he joined the Security Systems group, and was responsible for the design and implementation of the Fortuna design system. End of 2002, the company **dot**rix was created from the Industrial Printing Group of Barco. In this company, Jan is Manager Security Systems. In this function he is responsible for the Fortuna, SecuSeal and SecuPass /Insider products.