Toner-Based Digital Color Presses at IPEX

Detlef Schulze-Hagenest; Kodak Graphic Communications GmbH; 24106 Kiel, Germany

Abstract

Toner technologies, specifically electrophotography, are leading digital printing technologies in most segments of the marketplace. The presentation related to this paper gives an overview of the toner-based products shown at IPEX from the print technology and paper handling view and puts them into the context of digital production printing.

IPEX 2010

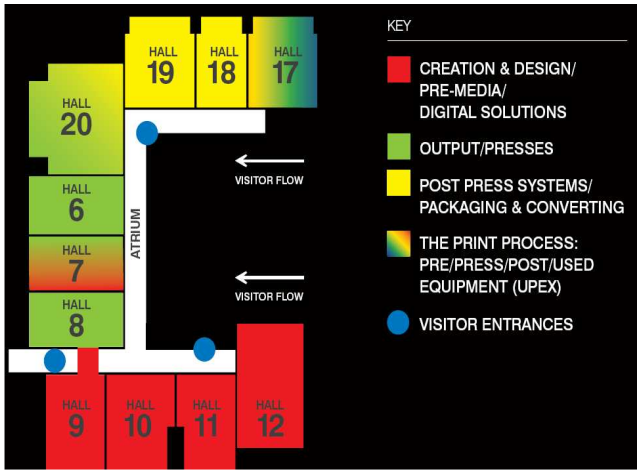


Figure 1: Hall plan of IPEX 2010, Source: IPEX

The International Printing Machinery and Allied Trades Exhibition (IPEX) is the largest printing and graphic arts trade show in the English-speaking world. Together with Drupa (Duesseldorf, Germany), PRINT (Chicago, USA), and IGAS (Tokyo, Japan), IPEX in Birmingham, United Kingdom, is one of the big four international printing events, each running on a four-year cycle and supported by manufacturers and suppliers of graphic arts equipment and services from around the world.

Regarding size and attendance, IPEX ranks second behind Drupa. At IPEX 2010 about 2000 exhibitors from more than 40 countries, over one third of them new, showed their products to ~50.000 visitors from 126 countries [1]. IPEX showed developments in all parts of the industry from creation through prepress, press, and post press (Figure 1).

Most activity and visitor interest, however, was centered on the digital printing area [2], which for the first time was the dominating part of IPEX. IPEX was very much an inkjet printing event but electrophotographic printing is still the mayor digital print process [2].

Toner-Based Digital Production Presses

Many developments have been shown in the toner press area. The color equipment offered concentrated on web presses realized as simplex or single-path duplex presses and B3+ sheet fed presses offering internal two path duplexing. Meanwhile, some digital electrophotographic presses offer the possibility to print with more than four colors. Regarding printing technologies used it is notable that the majority of web presses use noncontact fusing technologies, whereas hot roller fusing dominates for sheet printing. More sophisticated calibration systems are announced that may help to optimize and stabilize print quality.

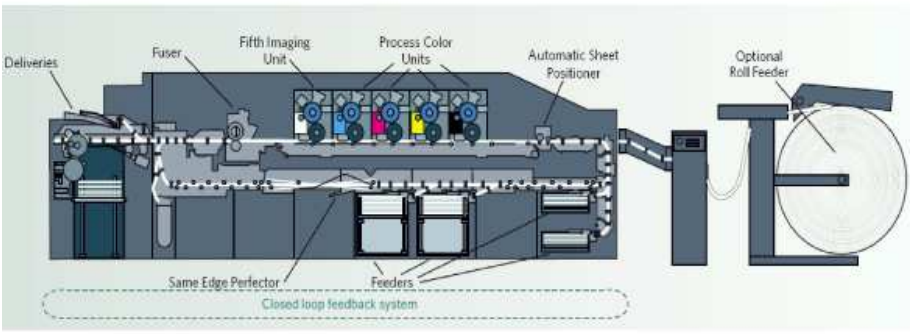
KODAK NEXPRESS SE-Class Digital Production Color Presses

As an example of toner-based digital color presses the KODAK NEXPRESS SE-Class Digital Production Color Presses as presented at IPEX are reviewed more in detail here as they use an intelligent calibration system, and a wide variety of imaging innovations are enabled by the fifth imaging unit.

Current members of the KODAK NEXPRESS SE Platform are

- the entry model KODAK NEXPRESS SE2500 Digital Production Color Press,
- the KODAK NEXPRESS SE3000 Digital Production Color Press as the most flexible press in the SE family, offering the widest array of Fifth Imaging Unit Solutions, and
- the KODAK NEXPRESS SE3600 Digital Production Color Press as Kodak's most productive press at 120 ppm (A4/Letter).

Figure 2: KODAK NEXPRESS SE-Class Digital Production Color Press overview



Print Genius [3]

The KODAK NEXPRESS SE Platform features Print Genius, a suite of quality control and productivity tools and options that help to manage and maintain peak quality throughout the production run. The Print Genius quality suite encompasses hardware, software, and materials science innovations to optimize quality and consistency and covers the following subjects:

Image Science: Accuracy and speed to color, Match critical Pantone® PMS and Goe colors, high image quality and image consistency, smooth flat fields and gradients

Quality Assurance: Closed-loop feedback systems to increase quality and uptime, superior imaging components, KODAK NEXPRESS Intelligent Calibration System to increase output at peak quality

Workflow Productivity: Maximizes operator efficiency and press uptime, incorporates Adobe PDF Print Engine to minimize RIP time, boosts VDP performance with enhanced object caching, long life operator replaceable components maximize productivity

Intelligent Calibration System (ICS) [4]

A calibration target is printed for each of the four color modules. These targets are then scanned through Kodak's custom scanner with an automatic document feeder. The scans are analyzed and new calibration information is automatically sent to the LED imaging heads, which control the exposure levels of each printed pixel for each color channel. The LED imaging heads have internal processing units that readjust the exposure output in response to the calibration data. Pixel-to-pixel uniformity is maintained even in the presence of a variety of elements that could have adversely affected output quality (Figure 3). It takes only five minutes to analyze output and feed critical data back to the system for closed-loop color calibration.

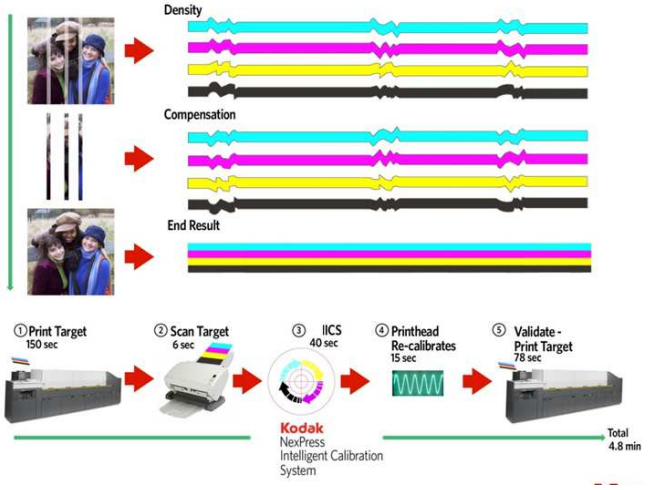


Figure 3: The principle of the KODAK NEXPRESS Intelligent Calibration System (ICS)

Fifth Imaging Unit Solutions

The KODAK NEXPRESS Fifth Imaging Unit Solutions add high-impact visual, tactile, and security capabilities to the prints such as

- **Extending color gamut** by adding red, green, or blue dry ink, increasing the color gamut by an additional 16 to 22% (Figure 4), [5]

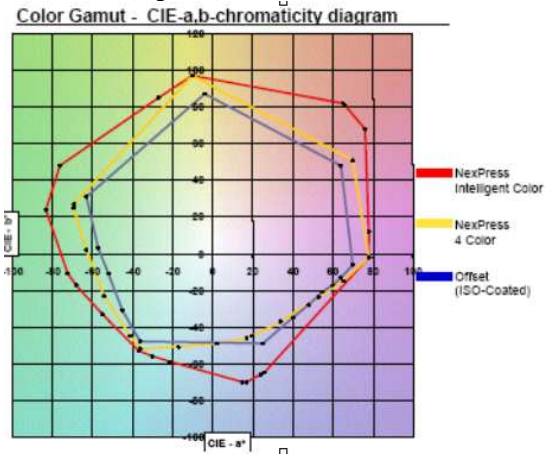


Figure 4: Color gamut comparison: Prints from offset printing compared with prints from KODAK NEXPRESS Digital Production Presses printing with four or five colors.

- **Security printing using MICR dry ink and micro-printing** (Figure 5), [6]

Figure 5: Check printing using KODAK NEXPRESS MICR Dry Ink in the fifth station of a KODAK NEXPRESS SE-Class Digital Production Color Press

- **Inline coating with clear dry ink** for unique effects such as watermarking and flood coating [5].
- **Glossing with near line glosser** to get high gloss results as achieved with UV coating but with the benefits of recyclability and to extend the life of the print (Figure 6), [5].

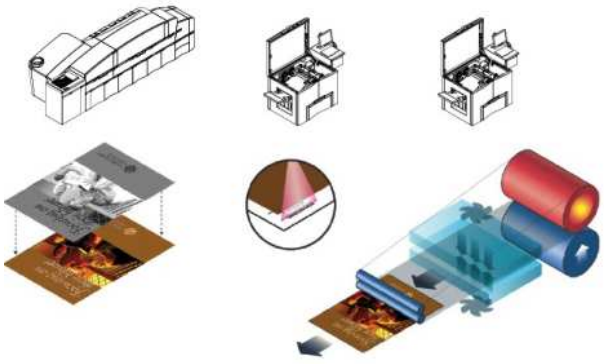


Figure 6: Intelligent glossing to achieve high-impact reflective and water-resistant surface: Step 1: Clear dry ink coating applied in press; Step 2: Substrate handling instructions provided via barcode; Step 3: KODAK NEXPRESS Glossing Unit adds high-impact finish

- **Dimensional Coating** gives specified text and images a raised or 3D effect [7]. KODAK NEXPRESS Dimensional Clear Dry Ink is a new dry ink that creates a clear "raised" layer on top of a page element after fusing (Figure 7). It can be used to enhance graphics, text, or a full color image. Kodak received awards for this feature from Intertech (2009 InterTech Technology Award), from the International Association of Printing, and received in 2009 a German Printing Industry Innovation Award.

Figure 7: Dimensional Clear Dry Ink printed in the fifth station of a KODAK NEXPRESS SE-Class Digital Production Color Press creates a clear "raised" layer on top of a page element after fusing.

- **KODAK NEXPRESS Red Fluorescing Dry Ink** launched at IPEX 2010 [8] that is clear when printed on top of images and graphics, and virtually invisible. When it is illuminated with an ultraviolet light source, however, it fluoresces a red color. The intensity of the red can be controlled by the amount of KODAK NEXPRESS Red Fluorescing Dry Ink that is printed on the page.

Figure 8: Red florescent security logo on a ticket digitally printed using Red Fluorescent Dry Ink in the fifth station of a KODAK NEXPRESS SE-Class Digital Production Color Press

Summary

Although commercial digital printing no longer automatically means toner-based printing alone, toner-based color printing is still the mayor digital print process and leads in print quality and paper latitude. At IPEX 2010 a variety of new products for the toner-based color market were introduced. Increasingly, the presses show additional functionally beside traditional four color printing or are sophisticated calibration systems that help to optimize and stabilize print quality. Forerunners for these trends, the KODAK NEXPRESS SE-Class Digital Production Color Presses as demonstrated at IPEX 2010, are discussed in this paper more in detail.

References

[1] "Print is back to business" IPEX Press Release, June 1st, 2010, www.ipex.org/page.cfm/T=m/Action=Press/PressID=480

[2] A. Tribute, "IPEX – A Digital Printing Show", WhatTheyThink?, June 1st, 2010, http://whattheythink.com/articles/article.cfm?id=44372

[3] KODAK NEXPRESS with Print Genius is One of the World's Most Innovative Solutions for High Speed, High Quality 4-Color Photo Publishing, Kodak Press Release, Birmingham (UK), May 21st, 2010

[4] S. Munechika, Improving Image Quality with the Kodak NexPress Intelligent Calibration System (ICS), Kodak White Paper February 2010

[5] D. Schulze-Hagenest, Profit from Change, How Kodak's digital printing solutions can turn daily challenges of change into the seeds of business growth, IS&T´s Frontiers in Digital Printing, Münster, Germany, 2008 p.4-12

[6] T.M. Plutchak, Defeating Fraud Through the Use of New Security Printing Features, IS&T´s DPP 2005 International Conference on Digital Production Printing and Industrial Applications, Amsterdam, The Netherlands; 2005; p. 110-111

[7] L. Christopher, Kodak Digital Printing Technology at Drupa, IS&T´s NIP25, 25th International Conference on Digital Printing Technologies, Louisville KY, 2009, p.440-420

[8] Kodak Introduces Virtually Invisible Ink for the NEXPRESS Production Presses, Opening Up New Security and Inventory Management Applications, Kodak Press Release, Rochester NY, May 13th, 2010

Author Biography

Detlef Schulze-Hagenest studied physics and intellectual property law in Hamburg and Berlin and received his PhD in physics from Kaiserslautern-University. Since 1980, he has been working in the field of platforms, processes, and materials for digital printing, with a special focus on electrophotography and inkjet. He is currently the Senior Engineer of Technology Development at Kodak Graphic Communications GmbH (formerly NexPress GmbH) in Kiel, Germany. He is the author of approximately 50 patent families, and practices classical music, amateur railroading, sailing, and gardening. He is a member of IS&T and served as General Chair of NIP24 (24th Int. Conf. of Digital Printing Technologies).