



HP INDIGO'S LABELS AND PACKAGING PRINTING TECHNOLOGY

BY KEMTEK IMAGING SOLUTIONS

HP Indigo's labels and packaging presses lead the market, outselling almost all narrow-web flexo vendors as well as all other digital vendors. They deliver the highest print quality, outperforming flexo and satisfying the requirements of the most demanding brands. With 4-colour process, extended 6- and 7-colour process printing, and the option to use spot colours mixed off-press, HP Indigo offers a very wide colour gamut and high colour accuracy. Furthermore, white ink permits use of clear, metallised and coloured substrates, enabling the entire portfolio to address a very broad range of labels and shrink sleeves.

This white paper describes the HP Indigo Digital Offset Colour printing process, or liquid electrophotography (LEP). HP Indigo offers a wide range of digital presses for labels and packaging, all based on the basic principles of its Digital Offset Colour technology. What is Digital Offset Colour? Let's break it down word by word:

DIGITAL

The printed image is created directly from digital data, avoiding the use of any 'analogue' intermediate media. It starts with digitally created pages or print elements containing, for example, text, layouts or images. Then, unlike conventional printing processes, there are no intermediate pre-press processes between the digital document file and the final print. No film, no imagesetters, no plates, no platesetters, and no other 'analogue' elements.

There is also no press make-ready: no plate mounting, no registration adjustments, no ink keys, and no waste. The HP Indigo process is fully digital from image creation to printing. And, since it is a fully digital process, every image can be a new

one, enabling information to be varied as required.

OFFSET

Offset simply means that there is an intermediate cylinder that transfers the ink image from its origin on the plate cylinder to the final substrate (i.e. the paper, plastic or other material) for printing. In the printing industry, the term offset is commonly used as a term for the lithographic process. Indeed, modern lithographic (also called litho) presses do use an offset process.

HP Indigo technology also uses offset printing, by the use of an offset cylinder covered with a renewable rubbery blanket.

There are two main purposes of offsetting in printing presses. First, it protects the surface of the printing plate from excessive wear due to friction with the substrate as it is printed. Second, since the rubbery blanket conforms to the local topography of the substrate, ink is adhered both to the 'peaks' and the 'valleys' of the substrate equally. In other words, it acts as a kind of shock absorber and pressure pad, ensuring good ink transfer from printing plate to the substrate. Conventional offset presses can therefore print on a very wide range of substrate surfaces and thickness, and are superior to non-offset processes in this respect. The HP Indigo process uses offset for the same reasons, thus making it capable of printing on a wide range of substrates.

A notable difference between conventional offset and HP Indigo digital offset printing technology is that HP Indigo's ink—ElectroInk—transfers from the blanket to the substrate with virtually no ink splitting that characterises conventional offset printing systems. This enables the creation and



HP Indigo WS6600 Digital Press



HP Indigo Digital Offset Colour technology enables printing on a vast array of substrates

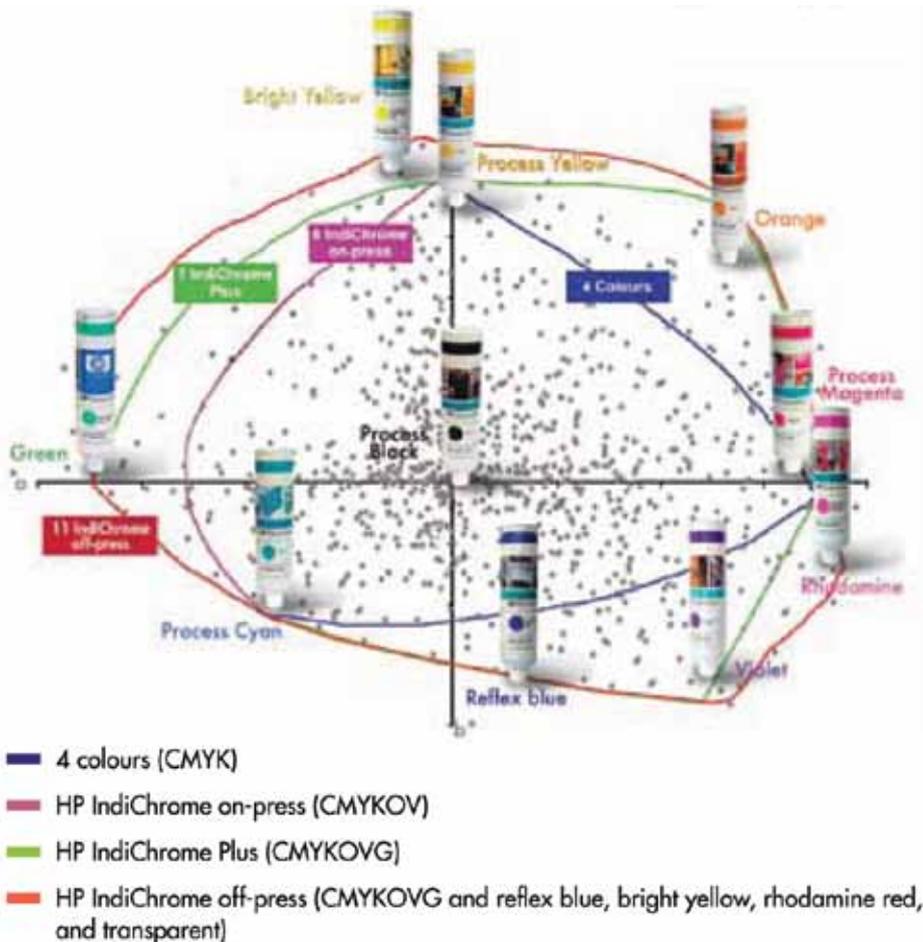


Figure 2: Schematic comparison of colour gamut with 4-, 6-, 7- and 11-colour HP Indigo ElectroInks

transfer of a different image each printing cycle.

A further difference is that HP Indigo ElectroInk is dried on the blanket and the final image is transferred to the substrate in the form of a ready dry film. This process does not depend on the final substrate.

Thus, there is almost no limitation to substrate flexibility, and all substrates are printed with the same high HP Indigo quality and at the same speed. Furthermore, since no drying is required the substrate does not undergo any further stress.

COLOUR

As it simply sounds, HP Indigo technology enables digital printing in full colour. However, unlike conventional litho presses, which require one complete printing unit per colour, HP Indigo presses print multiple colours for each single pass of the substrate through the press. As described above, in Digital Offset Colour technology all the ink transfers from the blanket to the substrate. The HP Indigo digital press transfers with each rotation of the press cylinders, on the single set of blanket and imaging plate, not

only a different image but also a different ink. HP calls the method or configuration 'on-the-fly colour switching.' This is all done without physical interaction between the different colour separations. Printing with 5, 6 or 7 colours, in addition to CMYK, the flexibility of adding pre-mixed HP IndiChrome spot colours, and the capability to vary the number of impressions per single colour, offers major enhancements in colour quality, range, fidelity, and luminosity (see figure 2).

In summary, HP combines digital, offset, and colour into a powerful printing process. The three core technologies of the HP Indigo Digital Offset Colour process are:

- ElectroInk – HP Indigo's liquid ink
- Thermal offset transfer
- On-the-fly colour switching

HP INDIGO ELECTROINK

All HP Indigo digital presses use ElectroInk, HP Indigo's unique liquid ink. ElectroInk contains electrically charged ink particles, dispersed in liquid. ElectroInk enables digital printing based on the application of strictly controlled electrical fields to move charged colour particles. This control enables accurate placement of the printing material. ElectroInk enables the use of very small particle size, down to 1-2 microns. These small particles dispersed in the liquid carrier allow for higher resolution, uniform gloss, sharp image edges, and very thin image layers. The thin image layer closely follows the surface topography of the paper. This gives a highly uniform finish, complementing the paper and resulting in a similar texture both on the image and on the non-image areas.

HP Indigo ElectroInk is available in an increasing range of colours, including:

- Standard CMYK (cyan, magenta, yellow, black) process colours.
- HP IndiChrome wide-gamut 6- and 7- colour sets. These incorporate orange and violet inks for the 6 colours and also green for 7 colours to extend the colour reproduction capabilities far beyond the range possible with CMYK inks only.
- HP IndiChrome spot colours – mixed from a set of base inks, matching spot colours including most of the PANTONE® colour range.
- White ink gives opaque backing for labels and flexible packaging.

ElectroInk is supplied in a concentrated form that is loaded into the press in cartridges in a 'clean hands' operation. Inside the press it is fed into ink supply tanks, diluted with oil and combined with a charging control fluid, to form a fluid mixture of carrier liquid and colourant particles ready for printing. The mixing is done under accurate automated control, resulting in a stable

WHITE PAPER

ink with nearly constant physical traits, leading to consistent prints. Furthermore, ElectroInk incorporates pigments which are the same as offset; this supports both the price and the availability of the final ink product.

To summarise, ElectroInk enables high quality, wide and accurate colour gamut, sharp images, and colour with gloss closely matching the media, similar to and at times surpassing conventional offset printing, and exceeding the quality achieved by competing digital printing technologies.

THERMAL OFFSET

The HP Thermal Offset process uses a heated blanket causing the specially shaped pigment-carrying particles within the ElectroInk to melt and blend into a smooth film. When it contacts the cooler substrate, the ElectroInk strongly adheres to the substrate, immediately solidifies and transfers with almost no change in dimension or shape. Since the image is completely defined on the blanket, issues such as ink media interaction or ink-ink interaction which are common in nearly all other printing methods are virtually nonexistent in LEP. The result is an image with a true offset look and feel, accurately replicating the gloss and texture of the substrate on which it was placed.

COLOUR SWITCHING

HP Indigo's Digital Offset Colour printing technology enables the printing of all colour separations by a single engine. After one colour separation has been created and printed, the next one (usually a different colour) is created and printed on the same engine. This is possible since the blanket completely transfers the previous image, and none of the image stays on the blanket.

Single engine printing has several obvious advantages, including compactness, lower cost of hardware, and better mechanical accuracy, but beyond that it offers the flexibility to balance quality with colour content and colour accuracy on the same press and even within the same run.

To summarise, the colour switching technology offers an optimal balance between speed and enhanced quality and at the same time minimises press footprint and cost of hardware.

SUBSTRATE COMPATIBILITY

HP Indigo's Digital Offset Colour process is compatible with a wider variety of substrate types, surfaces and thickness than any other digital printing process. These include paper, film, paperboard, and metals. Only one formulation of HP Indigo ElectroInk is needed to print on any stock that the press can handle. This means that HP Indigo press users can rapidly switch between substrates without having to worry about changing inks. With conventional printing, different inks for papers and non-absorbing plastic films are required; the latter usually need UV polymerisable inks. When printing on



HP Indigo 20000 Digital Press



HP Indigo 30000 Digital Press

paper stocks with different absorbencies, it may be necessary to adjust the viscosity of the ink by means of thinning or thickening agents, or even use specially formulated inks. Particularly absorbent papers can also increase offset ink consumption by up to about 50%, which contrasts with ElectroInk where consumption has almost no dependence on the substrate properties. The flexibility in media is what led HP Indigo industrial presses to be the leading source for digitally printed labels and thus are also replacing flexography in certain high-end applications.

In summary, the HP Indigo Digital Offset Colour printing process is the only variable imaging printing technology that can equal or exceed the quality, colour range, and substrate compatibility of conventional flexographic printing.

The HP Indigo WS6600 Digital Press is the most cost-effective, high-quality printing solution for high-volume labels and packaging production including cartons and flexible packages. Breaking digital productivity records with its printing speed of 40 linear metres per minute in colour, the press significantly pushes the crossover point vs. conventional processes making the vast majority of jobs more profitable when printed digitally. While enabling production of labels and packaging with the greatest shelf impact, the HP Indigo WS6600 Digital Press offers lower operational costs, improved supply chain efficiency, and shorter turnaround time.

The HP Indigo WS4600 Digital Press is a 'no compromises' entry-level solution that delivers high productivity and the finest quality, the press provides converters with all the tools they need to produce dozens of jobs per day with seamless job switching. It prints up to 15 metres per minute in 4-colour mode, 21 metres per minute in Enhanced Productivity Mode and up to 30 metres per minute in 1- or 2-colour mode.

The ground breaking HP Indigo 20000 Digital Press is a 762mm (30-inch) wide, roll-to-roll solution capable of producing diverse digital applications, including flexible packaging, labels, and shrink sleeves on film or paper from 10 to 250 microns.

The 75 cm HP Indigo 30000 Digital Press for folding cartons prints in offset-matching quality on any paperboard substrate up to 600 microns, including metalized board. The press expands addressable digital packaging jobs and improves supply chain efficiency, based on HP Indigo's brand accepted print process.

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