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White Paper

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Workflow Solutions for Packaging vs. Commercial and Publications Printers

Vancouver, Canada (March 30, 2007)—This document explains, at a very high level, the difference between workflow requirements for printers in the packaging market and those in commercial and publications. The differences are reflected in the **role** packaging printers play, the **products** they produce, and the **workflow** they require.

Role

Packaging printers play a different role than commercial and publications printers.

Packaging printers are often manufacturers or “converters," converting raw materials like paper, film, or foil, into a myriad of finished products such as tags and labels, folding cartons, corrugated containers, multi-wall bags, and flexible packaging, each with very specific requirements. As a result, they see printing as only part of their role (some converters argue printing is not part of their role), and often the most expensive part, as printing can be the single greatest cost component in producing a package.

There are about 1/5th as many packaging printers in the United States as commercial and publications printers, so commercial printers have a much larger infrastructure: more experts, more research, and more tools to serve their needs. This can make developing a tool for the commercial market easier, so the barrier to entry in packaging is much higher. This has resulted in vendors pushing commercial solutions on the packaging market. Packaging printers are very sensitive about this, so using commercial terms like "pages" or "signatures" around a packaging printer will make them feel Kodak® doesn't understand packaging.

Products

Packaging printers produce different products than commercial and publications printers.

A package is designed for display and serves purposes beyond just being readable: it protects the contents (in a convenient size and shape), promotes the product, and informs the customer. Unlike commercial printing where the substrate (paper) is *designed* to accept ink from the press, the function of a packaging substrate is as important as its printability. (Imagine trying to print the contents of this document on a plastic bag.) Not only is it more challenging to print on a variety of packaging substrates, there are other concerns in the process: adhesion, slip, rub, creasing, retained solvents, slitting, and die cutting to name a few*. Bar codes are also widely used in packaging, both for product identification and for automation of sorting, folding and cutting.

Workflow

Packaging printers require different workflow solutions.

Commercial and publications jobs can often run through prepress quickly and automatically. Preparing a packaging job for press usually involves hours of work on a single file, ensuring spot colors are present, trapping is correct, step and repeat is accurate, and the job is approved by a large group of stakeholders. Serious consequences result from mistakes getting on press: runs are generally much longer, substrates are much more expensive and legal and safety concerns strictly dictate the location and contents of ingredients on a package. Confidentiality is also a factor, as competitive product lines are often printed in the same shop.

One-Up Preparation

In the commercial market, dealing with long documents require page layout applications like Adobe® InDesign® software or Quarkxpress® software. Packaging pre-press usually treats one element as art, a "one-up artwork," and the most common illustration applications are Adobe® Illustrator® software or ArtPro™ software. These applications allow for manipulation of a single piece of art. Packaging customers are much more concerned with editing digital masters in prepress workflows, and require specialized editing tools to facilitate last minute changes to PDF digital masters, such as Kodak PDF Compare and PDF Merge software.

Kodak PDF Compare is an Adobe Acrobat plug-in that analyzes the design master file and production-ready file and highlights the differences between the two. PDF Merge allows you to extract prior work done on the

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* Adhesion is the ink's ability to stick to the substrate and stay where you want it. Slip refers to how easily the substrate moves through the printing process. This is complicated because a substrate with high slip (think of a wet oily plastic bag) is hard to stick ink on, meaning it has low adhesion. When something like a plastic bag is made, converters add things like wax in order to make printing on them easier. Rub describes how well your ink continues to stick to the material once its printed, since a package gets roughly treated during the printing process; for example, being stacked one on top of another (usually while wet) or moving through the bindery to get folded. This is usually called "rub-off". A newspaper has very bad rub-off, since the ink from the paper gets smeared while you handle it and sticks to your hands. If your package of potato chips did that, no one would buy your brand of chips again!

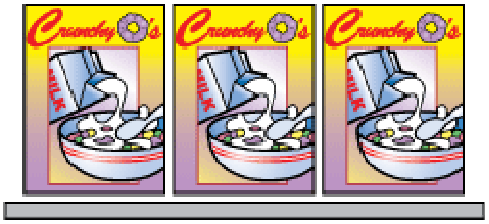
production-ready file (such as traps, screening assignment, geometry, and overprint settings) and merge all elements into the revised production file.

Kodak TIFF Front End software and TIFF Assembler Plus software make it efficient to gang work for flexographic output and to carry out quality control prior to expensive plate making.

Color Consistency

Books or magazines are usually stacked one in front of the other; packages sit side-by-side on a store shelf, often with different stock or print runs on the same shelf.





This means consumers compare products (sometimes the same product), so colors must match exactly from different runs, printed on different substrates, run on different presses, in different countries. For example, a cereal box, may sit on a shelf next to a cardboard advertisement (“shelf-talker”) printed on an entirely different material in a different geographic location. Packaging printers require a workflow solution that allows them to print to color profiles they have confidence in, throughout the workflow, and among different plants.

Colors are also extremely important for branding and packaging printers use a myriad of spot colors, varnishes, and special inks, sometimes running an entire job of non-CMYK inks. Because many jobs are printed on a clear substrate (for example, a bread bag), white and special varnishes are colors in the job, and six and eight color presses are very common. Kodak Spotless™ printing software provides spot color performance without the time and costs of printing brand or line colors with special inks.

Packaging often calls for special color printing plates, such as a "white back layer" for clear bags; Kodak Platebuilder software allows you to easily create white, varnish, or bump plates by eliminating several steps in the creation process.

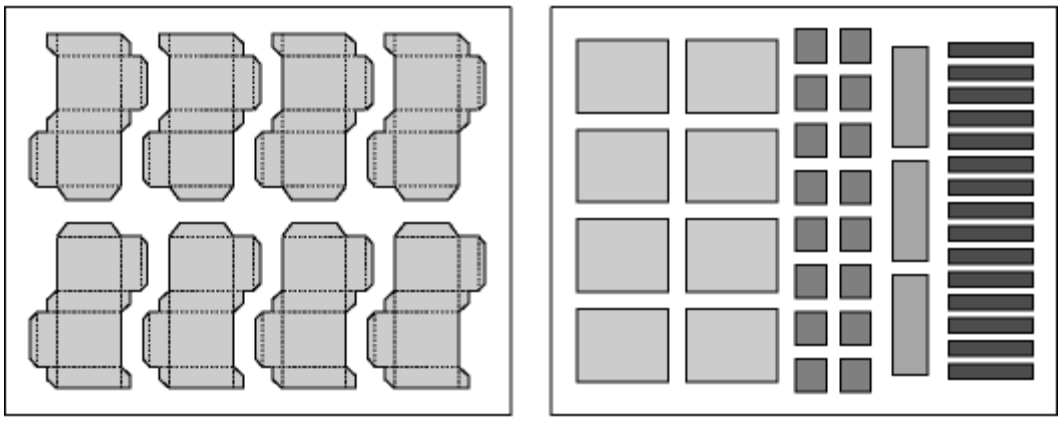
Advanced Trapping

Packaging printers often use wide and old presses to print on a variety of substrates that stretch, in the case of flexible packaging, or shift, in the case of corrugated substrates. Traps must be very wide to compensate (as much as.125", but commonly .004" to .007"). Most packaging jobs are trapped automatically with subsequent manual editing of each trap, so packaging printers prefer the control of a vector-based trapping solution such as the Kodak PDF Trapper software

Step and Repeat

Commercial and publications printers produce publications that need to be folded and bound, so they "impose" a number of "pages" to form a "signature." Packaging printers "step and repeat" a "one-up artwork" on a "layout." The one-up artwork is placed on a layout, and the "step" is the distance a second row is moved to

generate a staggered imposition, the "repeat" is the number of repetitions in both directions. This can be done manually (if the one-up is a simple shape like a water bottle label) or based on a Computer Assisted Design (CAD) generated die line (if the package is a non-rectangular shape like a cereal box) where the product is "nested" to optimize use of the substrate. Kodak's CAD Correct software can be used to create a CAD die file when one doesn't exist or correct an incorrectly prepared CAD die file.



Examples: Nested and square-cut step and repeat

Because the substrate tends to be very expensive and will be die cut, the step and repeat solution needs to be extremely accurate. The extremities of the one-up die line are defined in the one-up preparation stage (called job sizing), and need to be accurate to ensure the artwork snaps precisely to position in the step and repeat. The step and repeat solution also requires interactive work on the stepped illustration to account for trim and bleed, and to add marks, like Kodak Pandora® step-and-repeat software.

Proofing

Proofing and approvals are extremely important in packaging. The print buyers are Consumer Product Companies (CPCs) who demand many approvals, and strict legal and safety requirements dictate the location of elements like the barcode and nutritional information. Packaging printers proof at various stages in the workflow, including a print proof, using the plates on press prior to mounting on the final press. The Kodak Approval® proofer can be used for creating packaging prototypes. The packaging industry also demands sophisticated proofing equipment; five, six, or seven color jobs are common, and must be printed on or simulate a variety of substrates including aluminum foil, transparents, or corrugated board. A great proof on white paper can be useless if the final product will eventually be printed on brown carton, so the most important element in a proofing solution is a means of printing to color profiles, and determining that they will match on press. Proofing for packaging also calls for specialized proofs which contain printed information about the job, such as packaging dimensions, ink coverage and UPC code information. Some proofing can be conducted online remotely by tools such as Kodak InSite™ remote proofing software.

Output

Approximately half the packaging market uses flexographic printing methods; commercial uses over 80 percent offset. Flexographic printing requires workflow tools to accomplish special screening, to apply different screen sets to the same plate, and tools for various types of distortion, including:

a) distortion of the one-up artwork to accommodate the three-dimensional shape

b) compensation for plate elongation due to the thickness of the flexo plate

c) compensation for stretching or shrinking of the substrate

In addition, flexographic plates can be cut, so that flexo color plates are often ganged together and then cut and mounted individually.

Kodak has a number of award-winning workflow solutions for flexographic printing:

- Kodak HyperFlex™ resolution-enhancement software is a Kodak technology that helps to strengthen and support small dots and graphic elements on a photopolymer plate.
- Kodak Maxtone™ screening software is designed to counter problems found with conventional AM screening by allowing you to eliminate or minimize the noticeable transition from inked to non-inked areas, often referred to as the flexo break.
- Kodak DigiCap™ screening software is a Kodak screening technology which improves transfer of ink in solid areas of digital photopolymer media.

Storage

With print runs and remakes dependent on market demands, archiving and data management are extremely important. Packaging printers need an extremely long-term archiving solution for all elements of a job (the one-up artwork, step and repeat instruction, etc). In many cases, film and plates are archived for years.

For more information on workflow solutions in the packaging market, talk with someone on the Kodak packaging team.

Glossary

CPC: Consumer Product Company. CPC's are the print buyers in packaging.

CAD program: Computer Assisted Design programs used to generate the die line used to position one-up artwork on a layout.

commercial and publications: Segment of the market traditionally served by KODAK workflow products. Includes high-volume printers (print runs of 5,000 or more) producing products like: flyers, books, directories, technical manuals, catalogs, inserts, or color books.

converter: A manufacturer producing printed packages from rolls of paper, film, foil, or other raw materials.

die: A series of knives used to cut shapes from a press sheet.

die cut: v. Using a die to cut shapes from a press sheet for labels, boxes, containers, or other packaging jobs. n. A cleft, gash, slit, or notch left from a punching out operation.

die line: The electronic file that represents the physical die during layout creation. Usually the die line is created by a Computer Assisted Design (CAD) program and it helps the converter position the artwork on a layout. (Commercial term: imposition template)

distortion compensation: Distorting artwork to allow for stretching or shrinking of a plate.

flexography: Printing method that uses raised-image plates made from rubber or photopolymer to print on virtually any substrate.

imposition: Positioning pages on a press sheet to meet press, folding, and bindery requirements.

imaging "in the round": Imaging of a continuous sleeve of polymer material or a plate that is pre-mounted to a sleeve (plate on sleeve). After imaging the sleeve is mounted directly onto the press.

job sizing: Defining the extremities of the die line of a one-up artwork for positioning on a layout.

layout: Positioning one-up artwork on a press sheet to meet finishing requirements. (Commercial: imposition)

nesting: Inlaying non-rectangular shaped one-up artwork on a press sheet to optimize use of media.

one-up artwork: A packaging job element. (Commercial: page)

page: A commercial job element.

seamless: Used in gravure cylinder printing, this screening method ensures that the dot pattern at the top of the image matches the dot pattern at the bottom so when it is wrapped around a continuous cylinder, there is no break or apparent artifacts where the image top and bottom meet.

signature: A group of pages in an imposition ordered and aligned for folding.

split-line trapping: (AKA: Trap Trimming in Prinergy) In flexo packaging, where trap sizes are usually larger than commercial work, there is increased chance of misregistration caused by large traps around thin objects. Trap trimming automatically clips traps that might extend into the object receiving the trap.

step and repeat: Repeating the same or various one-up artworks by stepping them into position on a layout. Can be automatic (using a CAD generated die line) or manual (using a predetermined measurement). (Commercial: signature)

trade shop: Prepress shop supplying film and plates to packaging printers.

UPC: Universal Product Code. The standard bar code printed on retail merchandise. The UPC is read by passing the bar code over a scanner at checkout counters in supermarkets and retail stores.

About Kodak Graphic Communications Group (GCG)

The leading provider of graphic communications solutions worldwide, Kodak's Graphic Communications Group (GCG) offers image capture systems; professional color, copydot, and high-speed document scanning systems; inkjet printing and proofing systems; workflow and color management software; thermal imaging devices for film, plates, and proofs; high-quality proofing media, printing plates, and recording film; on-demand color and black-and-white printing systems; data storage products; and professional services. With corporate headquarters located in Rochester, N.Y., Kodak (NYSE: EK) has the largest global sales force and is committed to a digitally oriented growth strategy. For more information, visit www.graphics.kodak.com.

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