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Internal:
Release date: 23 October 2007

White Paper

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The evolution of PDF, and the importance of native transparency support in the PDF workflow

The power of version 4 of **Kodak Prinergy Connect** and **Prinergy Evo** Workflow Systems

From CT/LW to the PDF Digital Master

Almost 20 years ago, Scitex helped usher **PostScript** into high-end color print production with the introduction of a RIP that converted **PostScript** pages to CT/LW format. Dedicated editing workstations provided editing features that led the industry for years, until desktop tools grew in power and began to feature similar capabilities. **PostScript**'s flexibility was also its Achilles' heel: it could take minutes or hours to RIP complex pages. In 1991, John Warnock, the then-CEO of Adobe Systems and co-inventor of **PostScript,** wrote a short article about this problem, and proposed a solution he called "Interchange **PostScript**". From that seed grew the Portable Document Format, PDF, which now encompasses millions of pages produced, read, and posted each day.

Ten years ago, Agfa and Creo introduced the **Agfa Apogee** and **Creo Prinergy** Workflow Systems, which used PDF as a production file format. These systems triggered a controversy: was PDF prepress-ready, and what would be the future of CT/LW?

CT/LW vs. PDF

CT/LW (Contone/Linework) format was the underlying technology of high-end color prepress systems throughout the 1990s. It included two images of different resolutions: medium resolution for imagery, and high-resolution for graphics and fonts.

CT/LW and PDF both manage captured images—such as those from digital cameras—in continuous tone (contone) format. They differ in how they store illustration and text data. PDF stores graphical elements in a form similar to **Adobe Illustrator** Software—as descriptions and

instructions (often called vector art) that describe how to outline and fill them. In CT/LW, these elements are RIPed to a high-resolution raster representation.

The advantages of the PDF format include:

1. **Size**. Vector art tends to be smaller than equivalent rasterized art
2. **Resolution independence**. Vector art is rendered to the output device's resolution—screen, film, plate, and inkjet—to take maximum advantage of the device. LW must be massaged to fit different devices, and that produces variations in output. Text can look "soft" at 300 dpi but "crisp" at 2400 dpi.
3. **Compatibility**. Small files that can be read with a free reader means that PDF files can easily be sent to clients for review and approval.
4. **Editable**. PDF files can accommodate changes in text late in the prepress stages.
5. **Transparency**. PDF can accommodate the full range of Adobe's transparency model available from **Adobe Creative Suite** Software, while the CT/LW paradigm has to stretch to accommodate it.

In the early phases, the flexibility and reduced size of PDF came at the cost of reliability in viewing and rendering. It took several years to work out the bugs of this new file format, but we are now at the point where imaging errors are about as few as in CT/LW. Adobe continues to invest in transparency technology for OEMs such as Kodak to provide PDF benefits all the way through the production cycle without having to "flatten" transparency.

The evolution of PDF/X

As PDF became a viable file option for prepress, the CGATS (Committee for Graphic Arts Technical Standards) convened to define a production subset of PDF geared to the highest reliability in the exchange of PDF files for print purposes. PDF/X (the X stands for Exchange) limits PDF to the most reliable portions of the specification, and removes other media, such as sound and movies. The first version of PDF/X, PDF/X-1, was produced on a **Scitex Brisque** Software system and imaged on a **Creo** CTP Device for Time Inc. Major publishers and service bureaus produce PDF/X-1 files for offset print each day.

While PDF/X-1 is directed towards publication printing, the quest for a color-managed standard led to the development of PDF/X-3. In PDF/X-3 files, images and graphics do not need to be in the CMYK format specified by PDF/X-1, but in any color space, as long as they are accompanied by the related ICC color profile, and the intended print condition. PDF/X-3 is intended for color-managed workflows. Recent work in PDF/X has focused on the introduction of transparency into the PDF/X family, which will be done as the product suite and equipment can support it. This next version of PDF/X will likely be called PDF/X-4.

Transparency handling – 2000 - 2007

For the past six years, commercial and packaging printers have been struggling to process files containing transparency. The widespread usage of transparency among graphic designers took off in 2000 with **Adobe Illustrator** 9 Software, which enables designers to easily apply transparency effects to vector artwork, creating translucent shapes, text, drop shadows, and masks. Designers embraced transparency, and the print industry was left scrambling to catch up.

To RIP these files, printers were forced to flatten images containing transparency into **PostScript** or PDF 1.3 files. The flattened files were often unpredictable and inflexible—the flattener would make files much more complex, flatten the file incorrectly, or create lower-quality output. Because of the complexity of the flattened file, last-minute touchups often had to be done to the original file, delaying jobs significantly.

Transparency handling – 2007 and onwards

In 2007, Kodak launched version 4 of their **Prinergy Connect** and **Prinergy Evo** Workflow Systems. This upgrade allows printers to easily process transparent files without flattening them, resulting in predictable, high-quality results.

Prinergy 4 Software offers two enhancements for transparency. First, the Color Matcher and Trapper features have been upgraded to handle transparent objects natively. Second, version 4 includes the **Adobe** PDF Print Engine, with its full transparency support. Printers using any **Prinergy** 4 Software configuration can preserve transparency throughout the workflow, resulting in fewer errors, less rework, and better quality. **Prinergy** 4 Software's production tools, PDF Compare, PDF Merge, and PDF Plate Builder, have also been upgraded to handle transparencies natively.

Support for Transparent Objects Throughout the Workflow

Version 4 of **Kodak Prinergy Connect** and **Prinergy Evo** Software support transparent objects throughout the workflow. This provides the following benefits:

1. **Eliminates flattening**. This provides flexibility and convenience, and allows last-minute changes to the file without having to return to the software that created it.
2. **Simpler, faster, and more accurate trapping**. Because flattening is eliminated, trapping of files with transparent objects is simpler, faster, and more accurate.
3. **Removes artifacts**. PDF processing engines (such as Color Matcher and Trapper features) have been upgraded to handle transparent objects natively, eliminating artifacts that could be introduced during flattening.

The Adobe PDF Print Engine

Prinergy Connect 4 and **Prinergy Evo** 4 Software includes the **Adobe** PDF Print Engine, a new PDF RIP from Adobe Systems Inc. The **Adobe** PDF Print Engine allows PDF files to be rendered natively, using the similar technology that is in **Adobe Acrobat** and **Adobe Creative Suite** Software. This ensures that complex designs and effects, including transparencies, are reproduced reliably and consistently.

PDF Print Engine complements Adobe's legacy Configurable PostScript Interpreter (CPSI) RIP in **Prinergy** 4 Software. The PDF Print Engine can render PDF files with transparency faster than flattening to **PostScript**, which was required while using the CPSI.

The **Adobe** PDF Print Engine is not a replacement for CPSI, because there are still some files that it cannot handle. For backward compatibility, **Prinergy** 4 Software offers both technologies for legacy work and reprints.

The **Adobe** PDF Print Engine provides the following benefits:

1. **Preview/proof consistency.** With the **Adobe** PDF Print Engine, what you see is what prints. Adobe's print partners plan to create preview applications based on the same engine as the RIP, ensuring that on-screen proofs are accurate and consistent, and that designers know what to expect from the earliest stages of the project.
2. **Color modeling**. The **Adobe** PDF Print Engine uses ICC color profiles for color-managed workflows, so that the color the designer sees on a calibrated monitor matches the color in the proof and in the final print output. Because the **Adobe** PDF Print Engine can handle multiple color models, no conversion of RGB to CMYK or vice versa is required—colors remain as the designer intended them, and color management maps the colors for the output device.
3. **Accurate text rendering beneath transparencies**: The **Adobe** PDF Print Engine correctly renders text that is located below transparent images. Occasionally, when the CPSI RIP renders low-resolution proofs, the text appears fatter due to the flattening that occurs in CPSI. Because the **Adobe** PDF Print Engine does not flatten, it does not have this problem.
4. **Last-minute edits to the PDF file**. The **Adobe** PDF Print Engine makes it possible for creative professionals and printers to maintain the integrity of designs throughout the workflow. Using native PDF to power the print engine eliminates the need for transformations and compensation.
5. **Greater flexibility**. **Prinergy Connect** and **Prinergy Evo** 4 Software provide the option to use either the **Adobe** PDF Print Engine or CPSI RIP.

The following table illustrates various ways to handle files with transparent objects:

Input File Type	Transparency Setting Chosen in the Refine Process Template	RIP Chosen in the Output Process Template	Things To Consider
PDF 1.3 file Flattening occurs in the desktop software (for example, Illustrator)	File is already flattened.	File is already flattened.	• Useful for individuals who require PostScript, EPS, DCS, PDF 1.3, or PDF/X-1a for downstream processing.
PDF 1.4 file (and later)	Flatten to PDF 1.3	File is already flattened in refine process.	• This option was available in **Prinergy** Connect and **Prinergy** Evo 3.x Software. • Useful for individuals who require PostScript, PDF 1.3, or PDF/X-1a for downstream processing but want **Prinergy** Connect and **Prinergy** Evo Software to perform the flattening.
PDF 1.4 file (and later)	Leave as is	CPSI Flattener	• This option is available in **Prinergy** Connect and **Prinergy** Evo 4.x Software and later. • Useful for individuals who want transparent objects to be handled natively without flattening during the refine process. • If text exists underneath transparent images, the text might appear fatter in low-resolution output due to the flattening that occurs in CPSI.
PDF 1.4 file (and later)	Leave as is	**Adobe** PDF Print Engine (does not flatten)	• This option is available in **Prinergy** Connect and **Prinergy** Evo 4.x Software and later. • Useful for individuals who want transparent objects to be handled natively throughout the workflow and do not want the file to be flattened.

Conclusion

Production file formats have evolved considerably since the introduction of CT/LW, as have design tools and software. With the introduction of the **Prinergy** 4 Workflow Software, workflow processing software is now available to support all of the latest features.

The ability to handle transparency natively in the workflow is a step forward for the printing industry. The elimination of flattening provides the flexibility to make changes at any point in file processing, without having to return to the application software. Better trapping and fewer artifacts reduces file reworking time and the need for reprints due to errors. This will reduce errors in printing, support more complex jobs, and improve customer service.

What Were Printer's Lives Like Before Transparency Support?

"Dealing with transparency in electronic files has been a challenge in prepress since transparency was introduced. This is especially true in our packaging work where the designs tend to be more complex, and where a vast majority of design files we work with contain some form of transparency in the design—ghosting, drop shadows, spot color glows, Gaussian blurs. The process of properly flattening the transparency out of a file can be very time consuming and can, at times, possibly compromise the quality of the job."

"With native transparency support in **Prinergy** 4 Software, our workflow immediately becomes more efficient. We can now process more files in less time, with more accuracy, due to the fact that files can come straight from the front end applications and can be refined and trapped without flattening, saving approximately 35-40% of the time from the process."

Tim Staut, Workflow/Production Manager
Southern Graphic Systems

"The biggest issue for us is that of the 10% of files we receive containing transparency, we don't know which files need to be reworked when they come in because they look okay, and we often don't catch a file until it comes out wrong, resulting in wasted press time and plating time. Then we need to bring the file back into prepress to do the rework. Now, if we see a file that has those attributes and output it natively, we can be confident the file will come out right."

Rick Riegger
Japs Olson Company

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 http://graphics.kodak.com.

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