

PDF for Prepress Workflow and Document Delivery

Adobe PDF

Adobe® Acrobat® for the print publishing market today

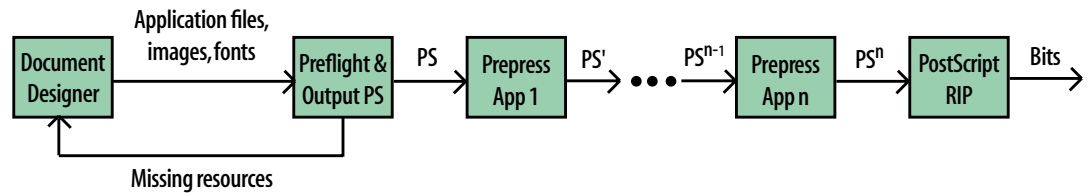
Adobe Systems Incorporated was founded on the development of what is now called the Adobe imaging model. This imaging model is a powerful way to represent text, graphics, and images in a coherent and consistent manner. It was originally implemented in the PostScript printing language and is now at the core of Adobe's wide range of printing and publishing technologies, including PostScript, Adobe's Portable Document Format (PDF), and application products such as Adobe PageMaker® and Adobe Acrobat.

Adobe PostScript is both the page description language that describes the format of a printed page, and the system that understands that language and converts it into the pixels that are imaged onto output media. As a general-purpose programming language, PostScript contains procedures, variables, and control constructs that must be interpreted to render its page description. This processing is required to be in sequential order such that PostScript files are streamed into an output device from the first byte to the last. This also means that PostScript files are not inherently page independent, such that the imaging operations performed on the last page of a document may depend on graphics state settings that have accumulated since the first page.

The Adobe PostScript language has become the standard printing technology for producing high-quality output. Central to the success of Adobe's PostScript product is the fact that it is a completely device-independent page description language. This means that the same file can be printed on desktop laser printers that cost a few hundred dollars or on high-end printing systems that cost hundreds of thousands of dollars, and the document will always print with the highest quality achievable by the particular output device.

Adobe Acrobat software, which is based on an Adobe imaging model similar to that of PostScript, was developed so that users could view and manage documents on-screen in a device- and application-independent manner. With Acrobat, documents can be created in virtually any application, on any platform, and easily converted to PDF, where they retain the full range of high-quality typography, graphics, images, and color. PDF files can be viewed, navigated, searched, printed, and archived in Macintosh, Windows,® and UNIX® environments using the free Adobe Acrobat software (available on Adobe's Web site).

The biggest issues facing prepress shops are predictability, reliability, and consistency of workflow. Most documents are delivered to prepress or print shops today in the authoring application format. Once received, the file enters a workflow process based on the Adobe PostScript language or proprietary formats. Adobe PostScript technology was initially developed as a language for describing pages and controlling printers, but its flexibility enabled it to become the data format for carrying all prepress and production information. With PostScript technology's flexibility can come unpredictability, in part because so many different applications generate PostScript in so many different ways and PostScript page descriptions can be arbitrarily complex. A typical imposition application may have to understand 200 or more different application versions of PostScript output. It is not uncommon for prepress application developers to spend half of their development time just keeping up with the latest application output streams.



Typical Prepress Workflow Based on Adobe PostScript

Another characteristic of PostScript language-based prepress workflow is that each prepress application must read in the entire PostScript file to understand its contents before being able to act on that file. Once any changes/updates are made, a new PostScript file is streamed out of the application. This is a very memory-intensive operation. Production workflows built around PostScript technology have to deal with both the complexity of the desired product and the apparent arbitrariness of the data stream.

In contrast, PDF files are highly structured and general programming constructs are not permitted. As a result, the imaging operations are usually much simpler. A PDF file can be thought of as a database of objects with direct access to each object, and each page of a PDF document is independent of the others. If a prepress application uses PDF files instead of the PostScript language as its input and output, it is able to directly access only the information needed and incrementally update the file. The prepress application also has just one format to understand—PDF. The apparent arbitrariness of PostScript technology is eliminated, so PDF provides the foundation for a print production system that delivers consistent, predictable results.

Prior to the definition of the PDF format used in Acrobat 3.0, many of the high-end printing features that PostScript language files can represent were not retained. New to the PDF format is the ability to describe the high-end printing controls and printed integrity available in the PostScript language. In addition, Adobe Acrobat 3.0 adds new features to the Acrobat application products to enable the creation of the new PDF format files and add value to them.

Why Adobe Acrobat 3.0 for the print publishing market?

Acrobat 3.0 includes the features necessary for PDF files to work seamlessly in production printing for color and monochrome workflows. When high-end printing controls are specified in the PostScript language output of an authoring application, they are retained in the PDF file when converted by Acrobat Distiller,[®] one of the components of Acrobat 3.0. PDF files can also be written directly from other systems. Regardless of where the PDF file comes from, once the features are specified inside the PDF file, they are output back into the PostScript language stream at print time. This happens automatically in Acrobat 3.0 and can be implemented inside any system that consumes and outputs PDF files directly.

The following are features new to Acrobat 3.0:

Portable Document Format

There are two new color spaces built into the PDF file format used in Acrobat 3.0 that are already part of the PostScript language. A separation color space can be specified for any separations (spot colors) to be produced by a given device. If the output device does not support the specified separation, it will use an alternate color space (specified in the PDF file) for predictable behavior. A second new color space, the pattern color space, allows the printing of PostScript language patterns.

The graphics state set in a PDF file has been extended to include some device-dependent parameters. This “extended graphics state” allows the specification of stroke adjustment, overprinting, black generation, undercolor removal, transfer functions, halftone screens, and halftone phase.

Open Prepress Interface (OPI) comments in version 1.3 will be maintained in PDF files, enabling OPI image replacement. Very large high-resolution images can be stored separately from the PDF file itself, allowing small files to be maintained and routed with the large images replaced at print time.

The Japanese version of Acrobat 3.0 is now available on the Macintosh and Windows® 95, and Windows NT® platforms. TrueType and PostScript language Japanese fonts are supported. Cross-platform, encoding-independent documents containing Japanese text are achieved through the internal use of Adobe's new CID (Character Identifier)-keyed font technology.

Acrobat Distiller

When a PDF file is created from a PostScript language file by using Acrobat Distiller software, the above features can be retained within the PDF file. The Distiller user interface gives the user control over which features to retain in the PDF file and what color conversions to apply.

Adobe Acrobat Exchange™ and Acrobat Reader

Most of the new PDF file format features described above relate specifically to how a document should print, not how it is viewed on-screen. As such, Adobe Acrobat does not use most of this information for displaying a PDF file.

New to Acrobat Exchange for the Macintosh, a component of Acrobat 3.0, is an Export PostScript or EPS menu item. This option enables users to output an EPS file and maintain the information necessary to do color separations in the importing application—such as Adobe PageMaker, Adobe Illustrator,* or QuarkXPress.*

If a typo is found in a document shortly before it goes to press, and the appropriate font is on the system, it can be corrected in Acrobat Exchange using the touch-up plug-in for simple text editing, before being output to a PostScript device.

Once the high-end PDF features are stored in the PDF file through Acrobat Distiller, they are output again when printing to PostScript from Acrobat Exchange or Reader. This means that if users specify screening in authoring applications, the information will be embedded inside the PDF file with the Distiller, ignored when viewed, and then output again as part of the PostScript technology stream at print time.

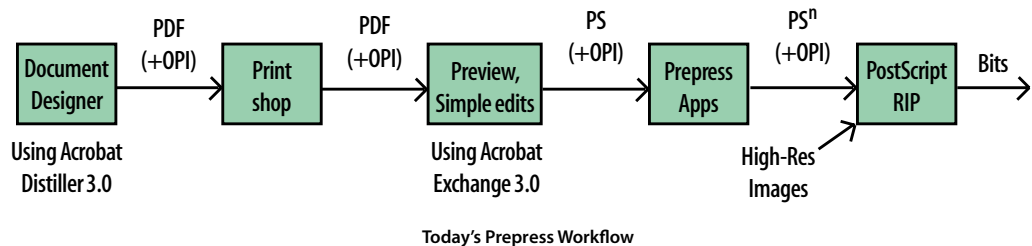
How will print publishing customers use this functionality?

One way in which many service bureaus are using PDF is to build predictable PostScript language files to either print directly or put through a prepress workflow. When an application file enters their shop, they use the authoring application to output it to the PostScript language, convert it to PDF using the Acrobat Distiller 3.0, view it as a soft proof, and then output to the PostScript language using Acrobat Exchange 3.0. What results is a reliable PostScript file ready to be RIPed or processed by a prepress application. This process is particularly helpful when PostScript files are received for printing and the driver used in the creation of the file does not match the device configuration of the final output device. The process of going to PDF and then back to PostScript technology enables the service bureau to better control the creation of the PostScript language file.

As more users become familiar with the benefits of Acrobat and more applications support Acrobat, production printers will standardize on PDF as the delivery mechanism for documents headed for print. They will request PDF files from their customers instead of asking for the authoring application format or PostScript files. Some of the benefits of using PDF files for document delivery (for both the document creator and prepress/printer) are:

- Small file size (PDF files use industry-standard compression algorithms and are often significantly smaller than the equivalent PostScript language file or application file).
- Fonts, images, and graphics are contained within the document, streamlining electronic transmission and preflighting.
- PDF files are independent of the platform, operating system, and authoring application, and are viewable on-screen in Macintosh, Windows, and UNIX environments.
- One consistent, predictable, reliable format can be used for all documents.
- Late-stage text edits can be made before going to print.
- PDF files are ideal for archiving and retrieval.

Here's a typical scenario of using PDF for document delivery that can be used today: a graphic designer creates a document in a page layout program, includes the FPO (for placement only) images received from the print shop (which they scanned from photos), and then outputs the document to a PDF file. Any printing control features specified in the authoring application are maintained. OPI comments specified in the PostScript file are included in the PDF file so high-resolution images can be added back into the file before going to press. The (small) PDF file is then transmitted to the print shop, reducing the time and effort it takes to transfer. When the PDF file is received at the print shop, initial preflight is streamlined because all of the components are in one neat package and viewable on-screen. Any last-minute text edits are made. The document is generally output to a PostScript language file at this stage, maintaining the print controls originally specified in the authoring application. It is routed through a prepress workflow, high-resolution images that remained at the print shop are replaced in the file, and then it is output to final print.



Another benefit to delivering documents as PDF files is that a PostScript file that has been created from PDF tends to print more reliably than the original PostScript file. In the conversion to PDF, the *arbitrariness* is removed from the file, so that when it is converted back to PostScript technology it is more tightly structured.

The Associated Press AdSEND Project

The Associated Press (AP) operates a digital advertising delivery service called AP AdSEND. The AP delivers ads via satellite to newspapers throughout the United States using Adobe Acrobat software. Using PDF provides tremendous advantages for retailers and advertising agencies because of the cost savings, ability to make important last-minute changes, faster time to market, and higher reproduction quality.

At present, the AdSEND project includes more than 1,300 newspapers receiving ads by AdSEND; more than 400 major advertisers under contract to use AdSEND; more than 100,000 full-page ads per month; and 7,000 ads per day at peak times. These ads are all delivered as PDF files.

This year, AP AdSEND added full color support and service the magazine ad market as well. In addition, newspapers that receive PDF ads will use the "Export to EPS" feature of Acrobat Exchange to incorporate PDF ads into page layouts. This capability eliminates the need for many of the manual production processes where errors are likely to occur. Combining PDF ads directly in a page layout can result in a substantial cost savings to newspapers, because doing so can eliminate errors and the need to offer rebates or make good on misrun ads.

What the future will bring

The ability for customers to deliver their documents as PDF files to their print shop is a great first step, but the future of PDF in print production goes much further. For example, the structural properties of PDF files make them very attractive for the kind of work done in prepress production. At present, PostScript files are read and written at each stage of the process. Because PDF files can be incrementally updated, device-specific information such as traps and page placement for imposition could be added to a PDF file throughout the process without the need to recreate the entire file.

In the future, content creation applications will support placing PDF files as objects in a page-layout program. With the new Placed PDF capability, users will be able to output from content creation applications directly to PDF, without the intermediate step of exporting to PostScript. Placed PDF capability will further promote the use of PDF files instead of, for example, EPS files.

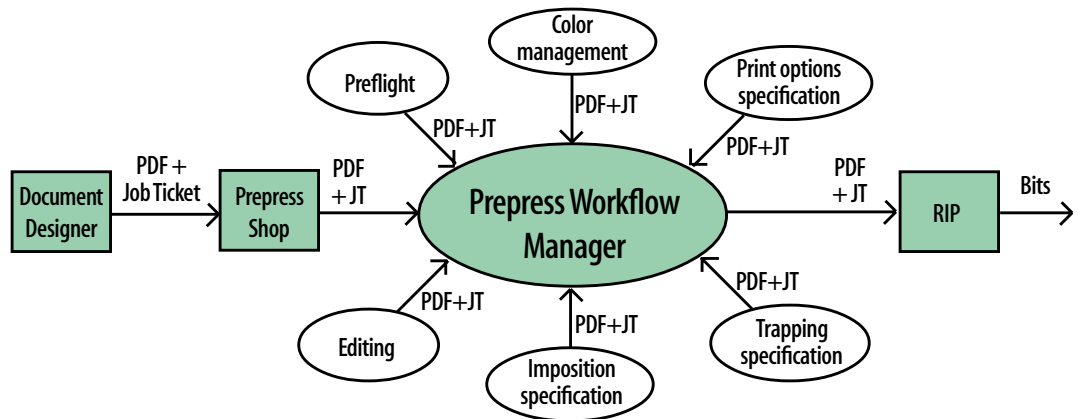
Workflow of the future

A graphic designer creates a document in a page layout program, and then saves it directly to PDF. The designer specifies post-press options in a PDF job ticket and then transfers the PDF file and job ticket to the print shop. The file is small, because it does not contain the high-resolution images that will be used in final print. They may be sent separately or scanned by the print shop and stored on a central file server.

When the job arrives at the print shop, a workflow manager automatically reads the job ticket and redirects it for processing based on output requirements, priority, and so on. The file is automatically routed to a preflighting station, where a report is generated listing all the fonts, images, graphics, document components, and the approximate print time. The prepress operator views the PDF file in Adobe Acrobat, specifies bleeds, and adjusts the imaged region on the media.

Next, color correction is applied to the PDF file, or individual images, as necessary. The file may be tagged with the proper ICC profile for both proofing and/or final output. Was there a last-minute change to a price or a phone number in the document? Late-stage edits can be made to text and image placement. Still working in Adobe Acrobat, screening is specified, spot colors are mapped to process (or other spots), and separations are created with the proper undercolor removal and black-generation settings. Much of this process is automated by the workflow manager as directed in the job ticket.

The PDF file is imposed for final output, and a signature is previewed before committing it to costly film or plates. The high-resolution images are replaced in the document. Next, the prepress operator applies trapping (or specifies trapping controls, and the trapping occurs in the RIP). Finally, post-press operations are specified for the job before final output.



PDF Workflow of the Future

This entire workflow can be done using a PDF file instead of a PostScript or proprietary format file. The size of the file being routed is small, it can be viewed at any time or archived for later use, and printing errors are almost nonexistent.

Acrobat Plug-in Strategy

The Adobe Acrobat architecture includes a rich application programming interface (API) that allows software developers to extend its functionality through custom plug-ins. Acrobat combined with PDF creates a friendly environment for third parties to develop vertical applications that meet specific customer needs. For example, imposition vendors needn't worry about supporting a hundred application flavors of the PostScript language: they can just support PDF as their file format. This means that they can focus their efforts on providing more value to the end users and spend less time in support engineering.

The prepress workflow of the future will include many applications and plug-ins that implement such functionality as preflighting, color management, imposition, additional late-stage editing capabilities, and more. Adobe and third parties will deliver solutions for production printing workflows based on the PDF file format.

Where are the applications today?

At present, various prepress ISVs (independent software vendors) and OEMs (original equipment manufacturers) are actively integrating PDF capabilities into their applications enabling an entirely PDF workflow to become reality. In the second quarter of 1997, several such ISVs are demonstrating PDF capabilities, (PDF input, output, information gathering, and modification) in their applications. Soon they will be shipping these products, and customers will be able to extend the usefulness of PDF into their prepress workflows. Here are some examples of what is being developed.

- Luminous Technology Corporation (an Imation Company) has three products that support PDF workflow. OPEN 1.1, now shipping, automates workflows for PDF production such as the creation of PDF files from desktop publishing applications or PostScript files, separation of PDF files using Acrobat Exchange and PrePrint Pro, optimization of PDF files for Web viewing, and the cataloging of PDF files into databases such as Cumulus and Media Manager. In Luminous Media Manager 1.0, PDF I-Piece adds full ability to catalog, preview and navigate PDF files from within the database. Luminous PressWise 2.x will have the ability to add PDF pages to any PressWise imposition and output as PostScript language or as PDF with an Adobe Job Ticket.
- EnFocus Software NV has two products that add value to PDF workflows. Tailor 2.0 for the Macintosh is a visual PostScript language editor that can export to PDF in addition to PostScript or EPS. In addition, Enfocus Software is now bringing out a plug-in for Acrobat Exchange, EnFocus Pitstop 1.1 for Macintosh and Windows, for editing the contents of pages in a PDF file. With EnFocus PitStop, you can make corrections to a PDF document at any stage in the workflow. For example, you can edit text lines, modify lines and curves, correct masks, and update object attributes.
- Imagexpo by Group Logic Inc. is remote softproofing software for viewing, annotation, and conferencing of images and documents in review and approval workflows. Imagexpo supports PDF softproofing with enhanced capabilities.
- The Crackerjack plug-in to Acrobat Exchange by Lantana Research Corporation provides professional printing tools for PDF documents by adding additional user control to the specification of the PostScript output from Exchange.
- Digital Image Bank Service (dibs) supplies high-resolution images in PDF to major retail, newspaper and ad agencies. They utilize the internet as well as the Associated Press network to distribute product images targeted for high production value advertising promotion.
- OneVision provides a fully functional toolbox for editing and manipulating PDF, PostScript, and Encapsulated PostScript (EPS) files. This enables OneVision products to completely adapt digital job files and their components to specific production requirements regardless of the software or computer platform used to create them.
- MediaSphere by Cascade Systems Inc. is a dynamic multimedia library, archive, and content management system. It is designed to meet the demand for a multiuser system that handles all types of digital objects, including PDF files. MediaSphere indexes the text of PDF files, which allows users to search the content of a PDF page and then query the database with text found in the search.

- Extensis Portfolio 3.0, previously named Extensis Fetch, includes built-in file translators for the PDF file format, allowing users to create thumbnails and previews of PDF files. Portfolio also lets users add keywords, custom fields, and descriptions to these thumbnails to make organizing and locating all their PDF files easy and fast. Portfolio will ship with both Macintosh and Windows 95 and Windows NT versions in one box, allowing users on both platforms to manage all their PDF files. Extensis Pre-Flight PRO bundled with Acrobat Distiller, plugs into Adobe PageMaker and QuarkXpress. It lets users check the status of a file and then package the file as a PDF file to send on in the print production workflow.
- DK&A provides full PDF support in their product, INposition version 2.0,* through its Tempus* integrated prepress plug-in technology. This will provide customers with comprehensive file support so that they can launch native QuarkXPress and PageMaker files, and it will provide full support for PDF, PostScript, EPS, TIFF, and PICT files.

Adobe Printing System Solutions

Adobe OEMs are implementing and demonstrating products that provide native PDF printing. These printing systems will be available for the desktop market as well as the production printing market. Native PDF printing is beneficial for those who store documents on the Internet or intranet, corporate networks, CD-ROMs, and anywhere PDF files are used as a standard file format. It also streamlines a PDF-based prepress workflow by enabling the PDF file to be read directly by the printing system. This capability relies on the ability of PDF to represent all of the PostScript language, so what is printed from PDF is identical to what is printed from PostScript technology, even for production quality color documents.

Adobe PostScript Extreme

Adobe PostScript Extreme is Adobe's new high-performance, standards-based, flexible architecture for production printing products. Its multiprocessor RIPing relies on PDF as its internal file format. PDF provides page independence and direct access to unique objects and resources in the file, which enables the page parallel RIPing required by PostScript Extreme.

Utilizing an architecture based on PDF enables production setup and processing in an application- and device-independent fashion. PDF files that are either sent to production from the creator/publisher or generated inside the PostScript Extreme architecture can be viewed, archived, and edited, regardless of the application or operating system that generated them. This enables critical production steps such as late-stage edits and pre-RIP viewing. The PDF architecture is flexible, enabling OEMs and other third parties to add specialized features for high-value vertical applications.

For more information, please consult the Adobe PostScript Extreme white paper.

Adobe PostScript 3

The recently announced Adobe PostScript 3 technology is the new standard for PostScript printing. Adobe listened very carefully to end-user needs when developing this standard resulting in many new features, enabling higher quality output, faster processing, and a more integrated complete customer solution. One very important feature in Adobe PostScript 3 technology is the full integration of PDF into the printing system. This enables Adobe PostScript devices to accept PDF files directly for imaging, streamlining a PDF-based workflow. Adobe PostScript 3 technology also includes in-RIP trapping which addresses one of the most complicated and problematic prepress steps inside and integrated with the RIP. In addition, selectable separations provide the ability to print separations on every Adobe PostScript 3 technology printing system, increasing the portion of the workflow that can be done in house.

For more information about the Adobe PostScript 3 enhancements, please consult the Adobe PostScript 3 white paper.

Becoming the Standard

Commercial printers see the great potential for Acrobat to become the tool used by their customers and trade shops to gather digital items in one standard page format—PDF. Prior to Acrobat version 3.0 being available, Acrobat applications lacked some of the functionality that would enable commercial printers to adopt PDF as a standard. Because this issue was so critical, a group of senior technology and production managers from 10 of the top commercial printing companies in North America formed an alliance called the PDF Group, which represents \$10 billion a year in sales in commercial printing.

The charter of this group is to advise Adobe on how to make PDF the standard file interchange format for commercial print production. Acrobat 3.0 addresses most of their recommendations, but an ongoing relationship between the PDF Group and Adobe will help to ensure that the needs of the production printing industry are addressed in PDF and supporting applications in the future.

The Committee for Graphic Arts Technologies Standards (CGATS) announced that Subcommittee 6 (SC6) of CGATS has selected PDF as a basis for a standard to address industry requirements for the digital distribution of printing data. CGATS formed SC6 in response to a need to develop standards to permit transmission of digital advertising data electronically.

For some time, there has been a need for industry standards to allow digital ad distribution. In response to this need, standards are being developed for digital ad distribution and to facilitate digital data exchange of composite page data for other print applications. The PDF file format is a central part of these standards.

Summary

Adobe Acrobat 3.0 extends the functionality of PDF, enabling the production printing industry to standardize on PDF for document delivery. Independent software vendors are actively integrating PDF capabilities into their prepress applications, building the tools to implement a PDF-based prepress workflow. PDF is also the internal file format used for RIPing in the Adobe PostScript Extreme architecture and is an input format for the PostScript 3 language. With files delivered into the print production system as PDF, prepress operations being done on PDF files directly and then output to the printing system as PDF, the entire print publishing process can be built completely upon PDF. The benefits of using PDF throughout the workflow are numerous. PDF files are small and self-contained, they can be viewed and archived, and are page independent. Adobe, in conjunction with third parties, will provide solutions for production printing workflows, all based on PDF.

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