



Océ

Adobe Portable Document Format

PDF Printing Explained for AEC Market



PDF Printing for AEC Firms

Today, Portable Document Format (PDF) files are used more than ever. And the architecture/engineering/construction (AEC) market is no exception. With Adobe® Reader® software being freely available for every computer, PDF has become the ubiquitous file format for electronically distributing, viewing and printing all types of data and information. Most reprographers report that PDF files have become the most common file type being received from their customers.

However, not all PDF files are the same. Adobe Acrobat® software and PDF files have been around since 1993. Over the years, Adobe has created many versions of Acrobat software, adding new features and expanding the functionality in many directions. PDF files can

contain text, drawings, video, 3D models, scans, full-color graphics, photos and hyperlinks. There are tools for book marking, adding markups and comments, creating electronic forms, adding security and digitally signing documents. With each new version of Adobe Acrobat software came a new PDF version to support the new features. Plus, there are numerous third party PDF creation applications, which when added into the equation give even more variation. And you thought all PDF files were alike!

Océ has noticed an increase in the number of PDF printing-related questions from our customers. Creating and printing PDF files without an understanding of all their nuances can create challenges and delays. Why do some files print perfectly while others don't? Why do some files take longer to process than others? This document will attempt to answer these questions and hopefully take some of the mystery out of PDF wide format printing.

Best-in-class sustainable products

Adobe originally released Adobe Acrobat software as a tool for creating and viewing PDF files in 1993. The idea behind Adobe Acrobat and the Portable Document Format (PDF) was to create a file format that could represent documents independent of the application software, operating system and hardware that was used to create them and of the output devices that are used to display or print them. A properly created PDF file should contain all the information required to view the document on any computer or to print the document to any printer.

Adobe Acrobat software and PDF file-formats have been continuously updated and expanded upon over the years. To date, there have been nine major releases of Adobe Acrobat software and the PDF file specification.

The following table lists some of the Adobe Acrobat/PDF versions.

Acrobat Version	PDF Version
Acrobat 4.x	PDF 1.3
Acrobat 5.x	PDF 1.4
Acrobat 6.x	PDF 1.5
Acrobat 7.x	PDF 1.6
Acrobat 8.x	PDF 1.7 (ISO 32000-1)
Acrobat 9.x	PDF 1.7 extension level 3

In addition, there have been several standards created to address the needs of certain markets. The PDF/A standard defines specifications for long term archiving of PDF documents. Another emerging standard for exchange of engineering documents is PDF/E. The graphic arts industry defined the PDF/X standards (there are more than one) to insure reliable print ready files. The main reason for creating these standards was to combat the growing variations in the PDF file format.

PDF was an Adobe proprietary file format, which meant that Adobe fully controlled the specifications and feature set. In 2007, Adobe released the full PDF 1.7 specification to AIIM, the Enterprise Content Management Association, so it could be published by the International Organization for Standardization (ISO). In 2008, ISO published the approved the ISO 32000-1 standard based upon PDF 1.7. ISO now controls and will produce future versions of the PDF specification. Hopefully, this will reduce the number of variations moving forward.

So why is it important to know that all these PDF versions exist? Because certain PDF versions print more consistently than others. And there are specific features that might be used in a PDF file that will greatly affect processing speed and printing accuracy.

Identifying PDF file creators and versions

Identifying which application created a PDF and what version of PDF it is can be useful in troubleshooting problem files. The application that produced the PDF file and the PDF version can easily be determined by opening a PDF file in Adobe Acrobat or Adobe Reader software and selecting Properties from the File menu.

Common PDF problems

Transparency

The most common issue that affects processing speed and can give



The PDF Producer is the application that created the file and the PDF version shows the version number (and the version of Adobe Acrobat that corresponds to that PDF version.)

unexpected print results is the use of layers and transparencies in PDF files. Transparency defines what happens when two or more objects overlap each other in a document. Transparency features are used extensively in Adobe Creative Suite® applications to apply special effects to objects, such as drop shadows, opacity and feathering. However, transparency may become an issue any time there are layers of objects in documents created with any application.

Understanding transparency issues requires an understanding of the flattening concept. During the processing of a PDF file for printing, the first thing that occurs is the 'flattening' of the document. (When printing directly from Acrobat, you can see a flattening status dialog.)

Flattening takes all the layered, transparent objects on the page and converts them into opaque objects that look the same as the original transparent objects when printed.

This flattening process can be quite time consuming depending on the complexity of the PDF file. Usually long processing time

equates to complex transparencies being flattened. Sometimes the transparent objects are not flattened correctly and the resulting prints do not match the original document. This usually results in “blacked” out areas or missing data in the printed output.

Fonts

Another common problem is missing fonts in PDF files. The fonts used in the original document should be included in the PDF file created from it. Sometimes the fonts are not included. This results in font substitution (i.e. wrong fonts) when printing.

Page Boxes

Page boxes define the physical dimensions or size of the PDF file. There are five types of page boxes (MediaBox, BleedBox, CropBox, TrimBox and ArtBox) that can be defined in a PDF that describe its size. A PDF file may not print correctly or take a long time to process if these are not defined properly.

Color

Most engineering and architectural drawings are created in color, even though they will be printed in black and white. It might be something as simple as color lines or a company logo. Or, there could be more complex color 3-D models or high-resolution photos. This color information makes its way into the PDF files.

While more and more documents are being printed in color, many are still printed in black and white. There can be issues when color is converted to grayscale. For example, the color yellow might be very visible on a monitor but will become a very faint gray when printed in black and white. For on screen viewing, RGB color is appropriate. However color printers typically use CMYK inks or toners. Colors can change during this conversion process. The absence or presence of color in a PDF and how the color is defined can impact processing times and the final printed output.

PDF Printing Methods

Now that you understand some of the common PDF issues, it is also important to know about the different ways a PDF file can be printed because this can affect the final printed output. There are two methods that can be used to print PDF files. The first is the Application/Printer Driver method. As its name implies, the Application/Printer Driver method requires two pieces of software in order to print a PDF file. The Application is software that can open and view the PDF file (e.g. Adobe Acrobat or Adobe Reader). The Printer Driver is software used by the application to convert its documents into a format that

can be printed. Both the application and a printer driver are required to print the document. The second method is called Direct PDF Printing. This method uses an application to submit PDF files directly to the printer. The PDF file is converted in the printer using a PostScript® interpreter or processor. No printer driver is required. (Please note that not all printers support this method.)

Knowing the advantages and disadvantages of each method can aid in getting troublesome PDF files to print properly.

Application/Printer Driver Method

If Adobe Acrobat software can open a PDF and it is displayed correctly on the screen, then there is a good chance that the PDF will print correctly. Both Adobe Acrobat software and the printer driver work to convert the document into a language the printer can understand. Adobe Acrobat software and the printer driver handle most of the processing and this occurs on the computer. During this process Adobe Acrobat software also flattens any transparencies in the file. The printer is given a rather complete file that should print correctly.

The disadvantage to this method is there is no easy way to handle batch printing of multiple PDF files. But, it is a good fallback when other printing methods fail.

Direct PDF Printing

The major advantage to the direct PDF printing method is its ability to batch print multiple PDF files in one job. However, there are certain caveats to be aware of when using this method.

There are many software and printer companies that have written their own interpreters to emulate Adobe PostScript software. Some are better than others. But, even when using true Adobe PostScript 3™ software, there is no guarantee that all PDF files will print correctly.

Since Adobe PostScript 3 software can only process specific versions of PDF files submitted using the direct PDF printing method. Not all PDF files are supported, or can be expected to process correctly. As seen in the table below, anything created with Acrobat 7 software or later has the potential to have issues with direct PDF printing.

Keep in mind all the third party software applications on the market that create PDF files. Some applications generate PDF files that print without problems; some do not. Some PDF creators even make different types of PDF depending on the content in the drawing. As you can see, there are many different types and versions of PDF files that you may run across.

Remember that not all PDF files are created equal.

Acrobat Version	PDF Version
Acrobat 4.x	PDF 1.3
Acrobat 5.x	PDF 1.4
Acrobat 6.x	PDF 1.5
Acrobat 7.x	PDF 1.6
Acrobat 8.x	PDF 1.7 (ISO 32000-1)
Acrobat 9.x	PDF 1.7 extension level 3



Direct PDF Printing with Océ

Océ wide format printers have Adobe PostScript 3 software offered as an option. If an Océ TCS, TDS or Océ ColorWave® printer has the Adobe PostScript 3 option installed, it can support direct PDF printing. Océ offers many job submission tools that allow direct PDF printing. These include Océ Print Exec® LT, Océ Print Exec Workgroup and Océ Publisher Select. Batch printing of PDF files can be easily accomplished using these tools.

Océ Repro Desk® software also allows batch processing of PDF files into print-ready files. The method it uses is very similar to direct PDF printing, but the software that processes the PDF files is located on the Océ Repro Desk computer, not the printer. Océ Repro Desk software can work with GhostScript® software CADzation™ AcroPlot Repro™ software, as well as other third party software used to process PDF files.

PDF Printing Solutions

Preflighting PDF files in Acrobat software should alert you to potential issues before actually printing the documents. In many cases, the problems can even be corrected. Both Adobe Acrobat 8.0 Professional and Adobe Acrobat 9 Pro software have preflight tools available to detect and correct common errors. While using Adobe Acrobat software can fix a good majority of PDF issues, it cannot fix

every problem. As we have seen, there are just too many variables involved in PDF creation that affect printing.

One of the easiest ways to avoid a large majority of PDF printing problems is to use the PDF/X standard. PDF files can be easily created in or converted to the PDF/X standard using Adobe Acrobat software (and many third party applications). The PDF/X standard is supported by Adobe PostScript 3 software and most third party processing software when using the direct PDF printing method. It was designed for the exchange of print-ready pages in the graphic arts and prepress world. PDF/X-1a and PDF/X-3 are two versions of this standard. Either one should work well, but Océ recommends using PDF/X-3 when possible.

The PDF/X standard requires that all fonts be embedded, appropriate PDF bounding boxes be specified, color be correctly defined and it eliminates transparency issues. Using PDF/X eliminates the most common errors in file preparation: missing fonts, color space issues, missing images, page box problems, and overprinting and trapping issues.

The PDF/X standard doesn't support transparency. So, the flattening is done when the PDF/X file is created. The result is that the PDF/X file generally processes more quickly than PDF files that contain transparency. It properly defines all page box settings. And because PDF/X encapsulates all the required page elements, such files generally have less printing issues. The one disadvantage is the file size can sometimes be larger than other PDF versions. When problems occur during the printing of a PDF file, the first course of action should be to convert it to PDF/X-3.

The PDF/X standard can also be set as a default for creating PDF files in Adobe products and other PDF generators. Standardizing on PDF/X may provide more consistent and reliable output with your printer or software.

There are many other preflighting tools available in Adobe Acrobat software that can correct printing problems. If the issues cannot be corrected, it should alert you to potential trouble. At the very least, you'll know there is a problem before printing and disturbing the documents.

Conclusion

As we have explained, not all PDF files are the same. There are countless variables that influence how a PDF file is created and how it will print. As the popularity of the PDF file format increases in the AEC market, reprographers will need to be better equipped to handle their complexities. Understanding the issues presented in this paper is a good first step.

Additional Resources:

Adobe PostScript 3

<http://www.adobe.com/products/postscript/>

Getting Started with Transparency

http://www.adobe.com/products/creativesuite/pdfs/transparency_quick_start.pdf

Adobe and PDF

<http://www.adobe.com/products/acrobat/adobepdf.html>

PDF Reference and Adobe Extensions to the PDF Specification

http://www.adobe.com/devnet/pdf/pdf_reference.html

Adobe Acrobat SDK Implementation of the PDF Specification, Version 8.1

Edition 1.0, April 2007

http://www.adobe.com/devnet/acrobat/pdfs/pdf_implementation.pdf

The PDF Page Boxes: CropBox, BleedBox, TrimBox & ArtBox

http://www.prepressure.com/pdf/basics/page_boxes

Adobe Acrobat 9.0 SDK Adobe Supplement to the ISO 32000

Edition 1.0, June 2008

http://www.adobe.com/devnet/acrobat/pdfs/adobe_supplement_iso32000.pdf

Document management — Portable document format — Part 1: PDF 1.7, PDF 32000-1:2008

First Edition, July 1, 2008

http://www.adobe.com/devnet/acrobat/pdfs/PDF32000_2008.pdf



Printing for Professionals

Océ helps the people who make our world. Companies everywhere use Océ high-speed printing, technical documentation, and professional document systems to keep the wheels of business, industry and government turning. Océ also helps the world. Developing products and services that add value to the document processes of our customers, while minimizing environmental impact and protecting health and safety, has always been one of our core principles. From bank statements to utility bills, from blueprints to newspapers, from on-demand documents to wide-format display graphics, Océ helps our professional customers go “Beyond the Ordinary” in print and document management.

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