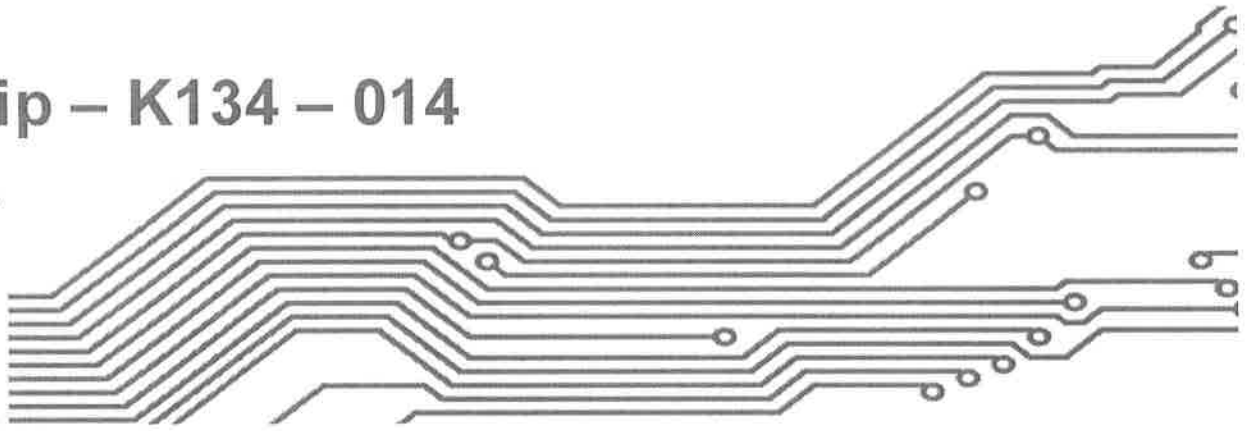


Tech Tip – K134 – 014



Model: KIP Systems with 7.0 and 8.0 Software

Re: PDF Printing Tips

Date: December 1, 2014

The following pages provide printing tips when working with PDF files. This detailed information helps explain why some PDF files print the way they do and how the switches provided in KIP PrintNET software can help to produce the desired results. These are some of the topics covered in this document.

- PDF Printing

- History of PDF files

 - PDF/X or “PDF for Exchange”

 - PDF/A or “PDF Archive”

 - PDF/E or “PDF for Engineering”

- Which Version of PDF File Do I have?

- Identifying Common PDF Issues

 - Transparency

 - Fonts

 - Page Boxes

 - Colors and Line Weights

- PDF Printing Methods

 - Application/Printer Driver

 - Direct PDF Printing

- PDF Printing Solutions

Portable Document Format Files

PDF Printing

Portable Document Format (PDF) Files have become the predominant file format for data exchange and printing. This is due to the extreme portability of the PDF file itself. Adobe® Reader® is a freely available viewer that is available on virtually every operating system. Users may download the software and once installed, can quickly see a standardized version of the created document.

The sheer volume of PDF files has allowed many vendors other than Adobe to create PDF creation applications. Over the years, Adobe has updated the functionality of not only the Adobe® Reader®, but the PDF file format itself. Files have become quite complex with text, drawings, 3D data, markups and file security. Unfortunately, until most recently, there was not a set standard of PDF file generation, thus leading to a myriad of file printing and viewing issues.

Users report that a file views properly in Adobe® Reader®, while printing the same document produces unwanted and unexpected output.

Understanding issues relating to PDF file generation and how to solve these issues will help ensure that the PDF files that are printed on your KIP printer are the best possible quality. The most important piece of information to remember is that PDF files are not all created equally.

History of PDF files

Adobe created the PDF file format initially as a method to send information around the Adobe campus. It was intended to usher in the age of a paperless society. PDF files are meant to contain all relevant data such as text, graphics and font as a user would see on their computer screen.

The first iteration of the PDF format, named "IPS" for 'Interchange PostScript' was shown at a Seybold Conference in 1991. Adobe announced PDF version 1.0 at Comdex in the fall of 1992. In 1993 Adobe created the first tools and viewers for PDF files called Acrobat.

Adoption of the PDF file format was slow to begin as tools and viewers were not freely available. File sizes, compared with text documents were much larger and would take an enormous amount of time to download over standard phone modems of the period.

As of this writing, there have been 9 iterations of the PDF file format, beginning with version 1.0 in 1993 and ending with version 1.7 in 2009.

Until 2007, PDF was a proprietary Adobe file format and the standards for PDF file generation were closely held within the Adobe organization.

In 2008, the International Organization for Standardization (ISO) published and released ISO 32000-1:2008 based on the full 1.7 Adobe PDF file specification. ISO will now control the future specification for PDF files. With ISO control and standards, the proliferation of sub-standard PDF files should be reduced as applications are now beginning to follow the open standard.

Several dedicated subsets of PDF file have been created over the years that are meant to aid in the creation and distribution of the PDF files. These subsets are now standardized within ISO or are in progress.

1) **PDF/X or “PDF for Exchange”** is based on PDF 1.3, PDF 1.4 and PDF version 1.6.

<http://en.wikipedia.org/wiki/PDF/X>

The purpose of PDF/X is to facilitate graphics exchange, and it therefore has a series of printing related requirements, which do not apply to standard PDF files. For example, in PDF/X-1a all fonts need to be embedded and all images need to be CMYK or spot colors. PDF/X-3 accepts calibrated RGB and CIELAB colors, while retaining most of the other restrictions of PDF/X-1a.

PDF/X files must not only follow certain restrictions, they also must contain a special file identification, inside the PDF, which says which PDF/X version they are. This means that a file can only conform to a single specific PDF/X standard, even if all other requirements are met.

The printing conditions or *output intent* need to be specified in the file.

In a PDF/X file that has color managed data, each color managed graphic gets its own color profile, so even though the file as a whole is CMYK, individual graphics may be RGB (with calibration information).

Various boxes must be defined. The MediaBox which defines the size of the entire document, either the ArtBox or the TrimBox, which define the extent of the printable area. If the file is to be printed with bleed, a BleedBox, which must be larger than the TrimBox/ArtBox, but smaller than the MediaBox, must be defined.

Active content is not allowed in a PDF/X file. This means that standard PDF features like forms, signatures, comments and embedded sounds and movies are not allowed in PDF/X. Features that are forbidden in the PDF/X standard can sometimes be used, if they do not affect the rendering of the file. This allows for things like annotations outside of the BleedBox

2) **PDF/A or “PDF Archive”** is based on PDF 1.4 and later as well as ISO 32000-1 – PDF 1.7.

<http://en.wikipedia.org/wiki/PDF/A>

The Standard does not define an archiving strategy or the goals of an archiving system. It identifies a "profile" for electronic documents that ensures the documents can be reproduced exactly the same way in years to come. A key element to this reproducibility is the requirement for PDF/A documents to be 100% self-contained. All of the information necessary for displaying the document in the same manner every time is embedded in the file. This includes, but is not limited to, all content (text, raster images and vector graphics), fonts, and color information. A PDF/A document is not permitted to be reliant on information from external sources (e.g. font programs and hyperlinks).

Other key elements to PDF/A compatibility include:

- Audio and video content are forbidden.
- JavaScript and executable file launches are forbidden.
- All fonts must be embedded and also must be legally embeddable for unlimited, universal rendering. This also applies to the so-called PostScript standard fonts such as Times or Helvetica.
- Colorspaces specified in a device-independent manner.
- Encryption is disallowed.
- Use of standards-based metadata is mandated.

3) **PDF/E or “PDF for Engineering”** is based on ISO 24517-1:2008 and PDF version 1.6.

<http://en.wikipedia.org/wiki/PDF/E>

The PDF/E Standard specifies how the Portable Document Format (PDF) should be used for the creation of documents in engineering workflows.

Key benefits of PDF/E include:

- Reduces requirements for expensive & proprietary software
- Lower storage and exchange costs (vs. paper)
- Trustworthy exchange across multiple applications and platforms
- Self-contained
- Cost-effective and accurate means of capturing markups
- Developed and maintained by the PDF/E ISO committee

The Standard does not define a method for the creation or conversion from paper or electronic documents to the PDF/E format.

Which Version of PDF File Do I have?

Using Adobe’s freely available Acrobat, it is possible to identify the version of PDF as well as the PDF producer. This information can aid in the proper reproduction of the PDF file. Identifying which application created a PDF and what version of PDF it is can be useful in troubleshooting problem files. Select “File → Properties” within Adobe Acrobat.

- 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

Advanced

PDF Producer: Acrobat Distiller 6.0 (Windows)

PDF Version: 1.3 (Acrobat 4.x)

Advanced

PDF Producer: Acrobat Distiller 5.0 (Windows)

PDF Version: 1.4 (Acrobat 5.x)

Identifying Common PDF Issues

Transparency

Transparencies are the most common issues affecting PDF file reproduction. Transparency or 'merge type' controls what layer or entities are shown on the final output image.

PDF version 1.4 was the first version of PDF that supported transparencies.

Transparencies are complex but can usually be easy to notice when printing issues arise. Issues with transparencies can be shown as missing data, solid black data, grids with thin white lines just to name a few.

When printing in color, it is possible to have an RGB image that is slightly translucent on top of a CMYK background. This will show as a "color shift".

These actions lead to the addition of transparencies to layouts:

- Making an object transparent in a lay-out or design application.
- Adding drop shadows to objects.
- Feathering objects.
- Placing native files which contain transparency from Adobe Illustrator, InDesign or Photoshop.
- Dragging & dropping or copying & pasting transparent objects from applications like Adobe Illustrator to Adobe InDesign.

In order for a RIP engine (PDF converter) to produce a file that is ready for a printer engine, it must first "flatten" the PDF file.

According to Adobe, Flattening divides transparent artwork into vector-based areas and rasterized areas. As artwork becomes more complex (mixing images, vectors, type, spot colors, overprinting, and so on), so does the flattening and its results.

Adobe's technical implementation of transparency is over 100 pages in length.

Adobe offers "A Designer's Guide to Transparency for Print Output" and can be found at the following location:

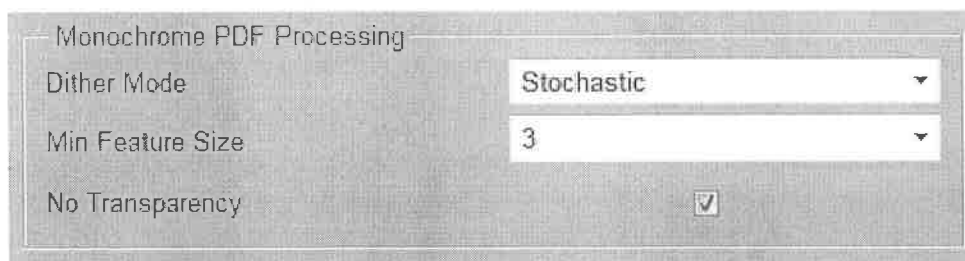
http://www.adobe.com/designcenter/creativesuite/articles/cs3ip_transguide.pdf

This flattening process is handled at the RIP controller using pscript.exe. Pscript.exe is a command tool that converts PDF/PS documents into a file format that recognized by the print engine.

When flattening occurs, a noticeable delay of output will be observed. This is typical amongst all RIP engines on the market today. Printing directly from Adobe's Acrobat software, there is a dialog box present where the flattening process is occurring and is visible to the end user.

Sometimes, flattening is not performed correctly due to the complexity of the transparencies within a document; an unusable, printed document may be the result.

Within KIP PrintNET, it is possible to enable or disable the flattening process by using the 'No Transparency' option. In order to set, it is necessary to log into PrintNET using the 'admin' account and then accessing 'Printer Config'.



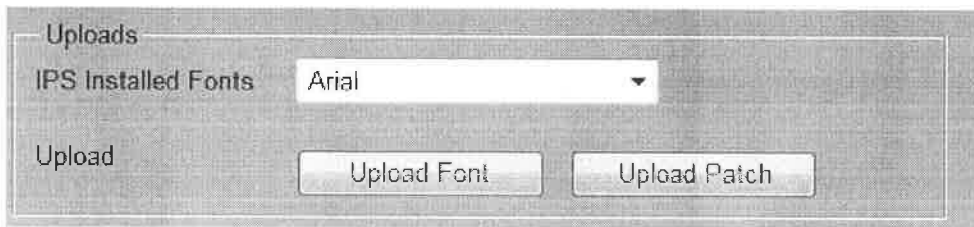
Selecting 'No Transparency' (set as default) ignores the flattening process. Unchecking 'No Transparency' enables the flattening process which may lengthen the time of the conversion process.

Fonts

Missing or incorrect fonts on the printed page is a result of 'font embedding'. Embedding fonts is a process where the application responsible for generating the original PDF embeds or includes the font in the PDF file. This font is then transported along with the PDF and will print faithfully even without the font being present on the printer controller.

It is possible to upload fonts to the KIP controller using PrintNET's Printer Config menu.

Log into KIP PrintNET as 'admin', enter 'Printer Config' and select Upload Font. Browse for the font to be installed and click Open. No further action is required.



Select 'IPS Installed Fonts' to view fonts currently installed at the KIP printer.

Page Boxes

Page Boxes help determine the PDF file size dimensions. There are 5 types of Page Boxes and each may be used in a PDF file.

- The **MediaBox** is used to specify the width and height of the page. For the average user, this probably equals the actual page size. For prepress use, this is not the case as we prefer our pages to be defined slightly oversized so that we can see the bleed (images or other elements touching an outer edge of a printed page need to extend beyond the edge of the paper to compensate for inaccuracies in trimming the page), the crop marks and useful information such as the file name or the date and time when the file was created. This means that PDF files used in graphic arts usually have a MediaBox which is larger than the trimmed page size. The MediaBox is the largest page box in a PDF. The other page boxes can equal the size of the MediaBox but they cannot be larger.
- The **CropBox** defines the region to which the page contents are to be clipped. Acrobat uses this size for screen display and printing. For prepress use, the CropBox is pretty irrelevant. The GWG industry association recommends not to use the CropBox at all.
- The **BleedBox** determines the region to which the page contents needs to be clipped when output in a production environment. Usually the BleedBox is 3 to 5 millimetres larger than the TrimBox. It is nice to know the size of the BleedBox but it isn't that important in graphic arts. Most prepress systems allow you to define the amount of bleed yourself and ignore the BleedBox. By default the BleedBox equals the CropBox.
- The **TrimBox** defines the intended dimensions of the finished page. Contrary to the CropBox, the TrimBox is very important because it defines the actual page size. The imposition programs and workflows that I know all use the TrimBox as the basis for positioning pages on a press sheet. By default the TrimBox equals the CropBox. When creating PDFs that are PDF/X-1a or PDF/X-3 compliant it is a requirement that the MediaBox, TrimBox and BleedBox are properly defined in the PDF.
- The **ArtBox** is a bit of a special case. It can define a region within a page that is of special interest. It is rarely used by applications. One way in which it can be used is to handle ads: on a PDF of a page on which there is an advertisement, the ArtBox can define the size of that ad. This allows you to place that PDF on another page but only use the ad from that PDF.

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

Colors and Line Weights

Most engineering and architectural drawings are created in color, even though they may be printed in black and white. It might be something as simple as color lines or a company logo.

There can be issues when colors are 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.

Line weights may become an issue depending on what printer the document is printed. Documents with very thin or faint lines may not reproduce properly on monochrome LED printers.

Again, it is possible to set a minimum entity size that controls overall line thickness as well as set a dither pattern within KIP PrintNET.

Log into KIP PrintNET as 'admin', enter 'Printer Config' and select the appropriate dither pattern and Minimum Feature Size.



The image shows a configuration window titled "Monochrome PDF Processing". It contains three settings:

- Dither Mode:** A dropdown menu set to "Mix (Photo)".
- Min Feature Size:** A dropdown menu set to "1".
- No Transparency:** A checkbox that is checked.

PDF Printing Methods

Now that we may understand some of the common PDF issues, it is also important to know about the different ways a PDF file can be printed as this can affect the final printed output as well. 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

Adobe's Acrobat is currently considered the 'standard-bearer' when it comes to PDF file accuracy. For that reason, if a PDF file opens and views properly within Acrobat, it therefore is a reasonable assumption that the file to be printed will be accurate.

When using an application such as Adobe's Acrobat, the application itself is responsible for the flattening, font creation and general output of the printed image. Typically the image from within Adobe is 'passed through' the printer driver and delivered as a postscript file to the printer conversion software.

Beginning with the KIP Windows printer driver version 5.13 configured with KIPScript output mode, the PC application is responsible for "drawing" the image to be presented to the printer driver. The printer driver's responsibility is to connect to the printer port and pass the data to the printer controller as a postscript file.

The disadvantage to this method is there is no easy way to handle batch printing of multiple PDF files.

Direct PDF Printing

Direct printing of PDF files via KIP Printt and KIP PrintNET or from the KIP Touch Screen allows a user to quickly output a batch set of PDF images.

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 warnings 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.

Keep in mind that of 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 encounter.

Remember: not all PDF files are created equal!

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. However, inconsistencies can arise depending on the Adobe version (be aware).

Adobe Acrobat Professional products allow a user to re-save or 're-render' documents to provide the best possible output. Flattening and line-weight issues may be resolved when re-saving.

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 RIP software and most third party processing software when using the direct PDF printing method. PDF/X-1a and PDF/X-3 are two versions of this standard.

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.

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.

