

# Investigation into PDF/X workflows for the graphic arts

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## Keywords

workflow, PDF, PDF/X-1a:2001

## Abstract

The RIT *Test Targets* publication has always explored new and emerging methods and technology used in color reproduction, process control, color management systems, and workflows. With the advent of PDF workflows and the introduction of the PDF/X family of standards, utilizing the new graphic arts data exchange format in the production of the *Test Targets 5.0* publication was recognized as an important goal. This article describes the workflow used in the creation of PDF/X-1a files that were supplied to the print provider selected to produce the *Test Targets 5.0* publication.

## Introduction

When Adobe released its Portable Document Format (PDF) in the early 1990s it was not intended to be used as graphic arts data exchange format. PDF was designed for the “paperless office of the future.” However, since its release, PDF has been adopted as de facto data exchange format in the graphic arts and is used to some degree in most current graphic arts workflows.

With the original design of PDF not being print-centric, there are many features that are ill suited for graphic arts workflows. Currently PDF documents can contain images from various color spaces, and documents can suffer from missing images and fonts, and other issues that make a document ill-formed and ill-suited for print production.

The Digital Distribution of Advertising for Publications Association (DDAP), a graphic arts workflow user association, realized the need for more stringent guidelines when using PDF as a data exchange format. DDAP was the first to define a set of requirements for using PDF as a graphic arts data exchange format: these requirements were later adopted by the Committee for Graphic Arts Technologies Standards (CGATS) as a working group item and the format became known as PDF/X (DDAP, 2005).

The developments of PDF/X by CGATS has attracted international interest and the PDF/X standard became an item of agenda for ISO TC130. The work carried out by TC130 resulted in the development of a family of PDF/X standards (conformance levels) suited for various graphic arts workflows. PDF/X has since become an ISO standard, falling under ISO 15930-1 for PDF/X-1 & PDF/X-1a, ISO 15930-2 for PDF/X2, and ISO 15930-3 for PDF/X3.

## Equipment & materials

This report was created using Adobe Creative Suite version 2. Creative Suite 2 is the desktop publishing suite used to create *Test Targets 5.0*. The NexPress NexStation and NexPress 2100 Digital Production Color Press were also used to test the complete *Test Targets* production workflow.

## Objectives

This paper will explore the various aspects of PDF/X and how the technology can be utilized in current graphic arts workflows without the need for specialized workflow tools. The article is based on the creative and prepress processes involved in the creation of *Test Targets 5.0*. The desired outcome are to:

- Gain a better understanding of PDF/X standards, specifically PDF/X1a.
- Examine the requirements to create a workflow that produces PDF/X1a (ISO 15930-1:2001).

## Methodology

The test method used was the review of workflow best practices and examination of features found in the Adobe Creative Suite.

## Assessment

The PDF/X1a:2001 standard has a few important requirements that must be met for the file to be in conformance. These requirements will be examined and then the Adobe InDesign application settings required to meet this conformance will be outlined. For a PDF document to conform to the PDF/X-1a:2001 conformance level, certain document attributes must be present. The requirements include device CMYK or spot color, the ICC data, the OutputIntent, the fonts, and trapping.

### Device CMYK or Spot Color

All color must be Device CMYK, or a spot color. Device CMYK means that color has already been separated to device dependent CMYK color values, such as the NexPress 2100 color space used in the production of this journal.

The color values can also be spot colors such as Pantone 165. The decision to include spot color names is dependent on the workflow and printing technology being used. Most modern RIPs have Pantone libraries that translate the PMS name into a CMYK value based on the colorants used by the device. For systems where it is unknown if the RIP has the necessary Pantone libraries required to handle PMS-to-CMYK translations, better results may be obtained by separating spot colors to their CMYK equivalents before

the exchange of the file.

In the production of the *Test Targets 5.0*, all spot colors need to be converted to Device CMYK when generation of the PostScript occurs.

### No ICC Data

No ICC data should exist in the file. All color data needs to be converted to the final destination space. Images cannot contain embedded ICC profiles. Images must be “Converted to Profile” in either Adobe Photoshop or by Adobe InDesign before the PDF/X-1a document is created. The *Test Targets* journal workflow strives to embrace an RGB-to-CMYK workflow in which all images are converted to CMYK at the final editing stage in the workflow. While InDesign has the functionality to handle this conversion, the Test Targets workflow had the images converted from RGB-to-CMYK in Adobe Photoshop. Due to the nature of graphic arts test targets, some images and targets are defined as legacy CMYK, such as those found in the *Gallery of Visual Interest*. These will remain legacy CMYK until they are converted to Device CMYK during PDF generation.

### OutputIntent

The OutputIntent must be specified either by stating a characterized printing condition such as CGATS TR001 (SWOP) or by identifying an ICC output profile. If the final output is to a SWOP conforming output device, the OutputIntent can be identified as “CGATS TR 001.” A list of registered reference printing conditions is located on the International Color Consortium’s website at <http://www.color.org/registry2.html>. If the final output is to a device that does not have a registered reference printing condition such as the NexPress 2100 digital printer, a custom ICC output profile must be identified. In the *Test Targets* workflow, the OutputIntent will be identified as the NexPress ICC profile name used for color conversion. It has to be noted that the OutputIntent used in Acrobat settings is not identical to the rendering intent that is specified by the ICC 4.2 specification (ICC, 2004).

### Fonts

All fonts must be embedded in the document. While subsetting is recommended to reduce file size, it is not required by the PDF/X-1a standard. The fonts used in *Test Targets 5.0* are: Arial, Helvetica, Optima, Palatino, and Symbol. At the request of the print provider, fonts were not subsetted.

### Trapping

The PDF/X-1a file must indicate if it has been trapped (true) or not (false). If the file has been trapped or you do not want the RIP to apply any trapping, the Trapped parameter should be set to Insert True. If the file has not been trapped and you want the RIP to apply trapping functions, the Trapped parameter should be set to Insert False. Adobe InDesign does not have robust trapping capabilities built in so it is recommended that the Trapping parameter be set to Insert False.

## InDesign Export versus Acrobat Distiller

A document conforming to the PDF/X-1a standard can be created by using either the PDF export mechanism

in Adobe InDesign or by creating a PostScript file in InDesign and distilling it using Adobe Acrobat Distiller. Adobe recommends that the PDF be created directly from InDesign. This is a more streamlined approach and does not require the translation from the PostScript Page Description Language (PDL) to the PDF PDL. The *Test Targets 5.0* journal workflow will generate PostScript files out of InDesign and generate the PDF/X-1a:2001 files using Adobe Acrobat Distiller.

## Procedures for creating a PDF/X-1a:2001 document using Adobe CS2

The remainder of this article will outline the steps used in creation of the PDF/X files for a workflow using Adobe InDesign and Acrobat Distiller.

### Adobe InDesign CS2

1. Launch the Adobe InDesign CS2 application.
2. Go to Edit > Color Settings to invoke the Color Settings dialog box.

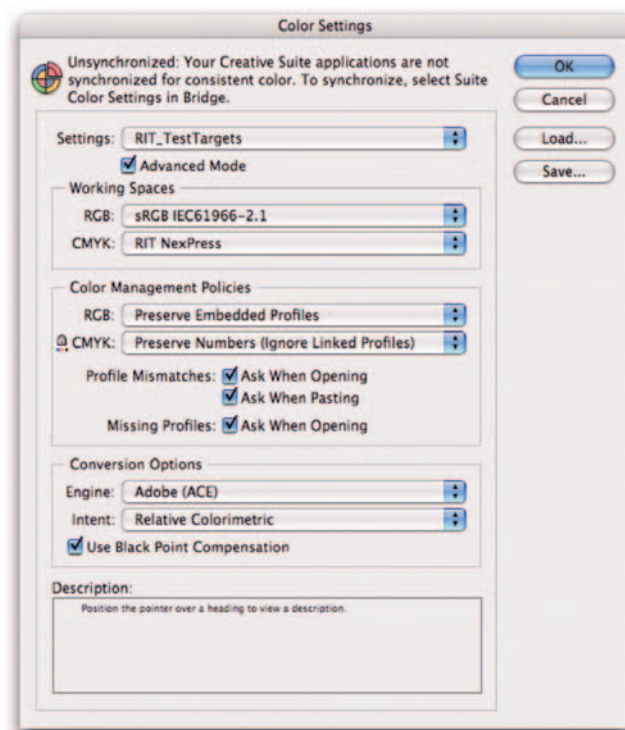


Fig. 1: Adobe InDesign CS2 Color Settings dialog box

Note: Document layout procedures are not covered in this report. The document should be designed with best practice methods for design and layout. Incoming images should be assigned source profiles before placing them in InDesign in Adobe Photoshop.

- 2.1 Make sure color management is enabled by selecting the “Enable Color Management” checkbox.
- 2.2 Set the Working Spaces options to desired color spaces by selecting an RGB and CMYK working space profile. The CMYK working space profile should be device that you output your print to, the NexPress 2100 in this case.
- 2.3 Select Desired Conversion Options. When finished, Select OK.

3. Once all layout procedures have been completed the layout is ready to be preflighted using the InDesign Preflight tool. The Preflight tool, shown in Fig.2, will catch any errors such as missing fonts or images and will provide a summary of the document. The preflight can be saved as a log file if desired. If errors are found in the preflight, they should be fixed before continuing. All the files can be packaged at this stage as well. Packaging places all the fonts and linked images in one folder.

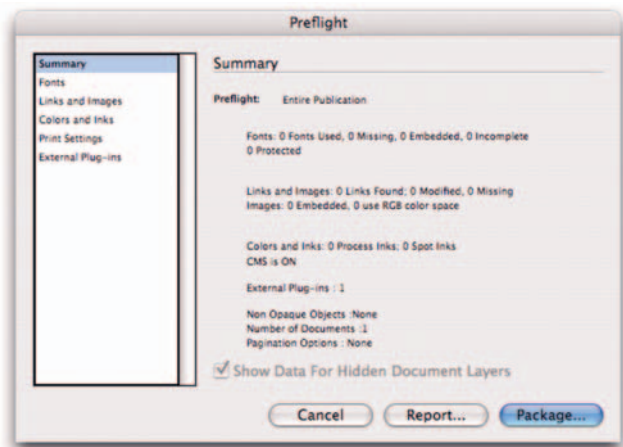


Fig. 2: Adobe InDesign CS2 Preflight dialog box

4. Once all preflighting procedures have been completed the layout is ready for PostScript generation. PostScript generation is accomplished by using selecting File > Print from the application File menu.

5. After selecting Print in Step 4, the Print dialog box will appear.

5.1 The settings shown in Fig. 3 should be changed to match the desired Printer and PPD. Since we are creating a PostScript file, the PostScript® File option is selected. The PPD selected coincides with requirements specified by the Test Targets print provider.

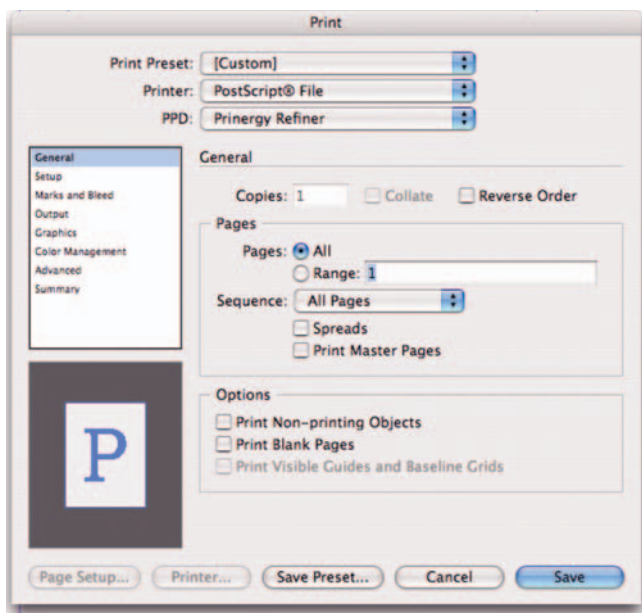


Fig. 3: Adobe InDesign CS2 Print dialog box, General Tab

5.2 The Color Management settings, shown in Fig. 4, should be checked to ensure that the file will be color separated correctly. Under the Print subhead, the Document option should be selected and the profile displayed should be the Device CMYK ICC profile. Under the Options subhead the Color Handling option should be set to “Let InDesign Determine Color.” The Printer Profile option should be set to the Device CMYK ICC profile. The Output Color option should read Composite CMYK.

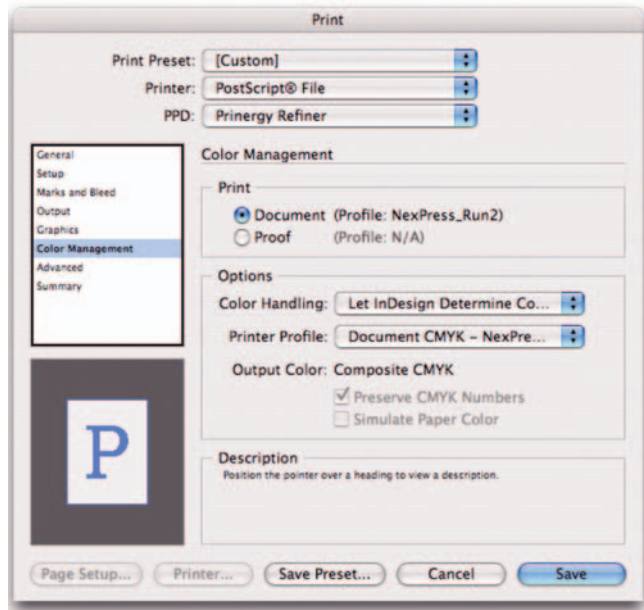


Fig. 4: Adobe InDesign CS2 Print dialog box, Color Mgmt Tab

It should be noted that not all the PostScript generation options were covered here. The other options, such as those found in the Setup and Marks and Bleed tabs are equally important but are job independent and have no effect on the generation of valid PDF/X files.

The PostScript file can now be saved.

### Adobe Acrobat Distiller 7.0

6.0 Now that a PostScript file has been generated, The remaining steps of the PDF/X-1a:2001 file creation process will occur in Adobe Acrobat Distiller. The following step will walk through the creation of a Acrobat Distiller PDF Settings file that will generate PDF/X-1a:2001 valid files and meet the requirements of the Test Targets journal.

6.1 Launch Adobe Acrobat Distiller.

6.2 Select the Settings from the application menu bar and then select Edit Adobe PDF settings.

6.3 In the General tab, shown in Fig. 5, the Compatibility option must be set to Acrobat 4.0 (PDF 1.3). The PDF/X-1a:2001 ISO Standard is based on this version of PDF. The resolution is set to 600 dot per inch, which matches the addressability of the Kodak NexPress 2100.

6.4 In the Images tab, Fig. 6, the Sampling options should be set to Off for all Images (Color, Grayscale, and Monochrome). In a normal graphic arts workflow,

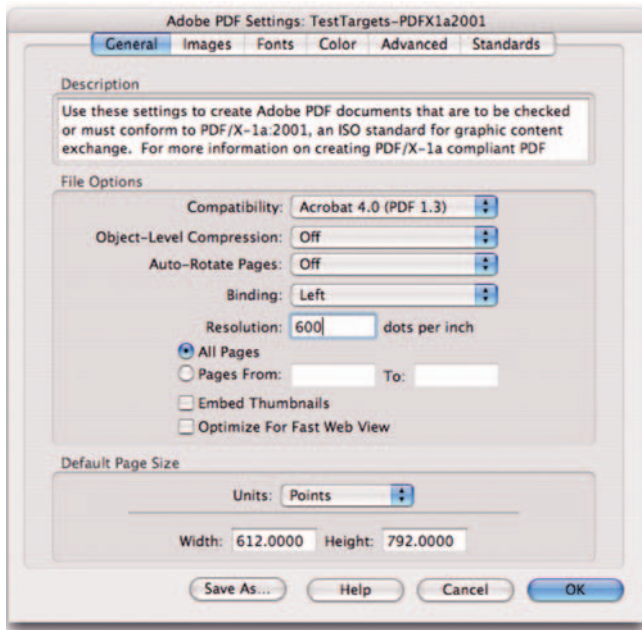


Fig. 5: Adobe Acrobat Distiller General tab of the Adobe PDF Settings dialog box

this might not be a desired choice as the resulting PDF could contain more data than need. For jobs that contain test targets, additional considerations apply. Some EPS test targets are intelligent and set themselves automatically to the addressability of the output device. This is likely higher than the threshold above which Distiller automatically downsamples. Downsampling would compromise the validity of the target. Therefore it is best to disable downsampling.

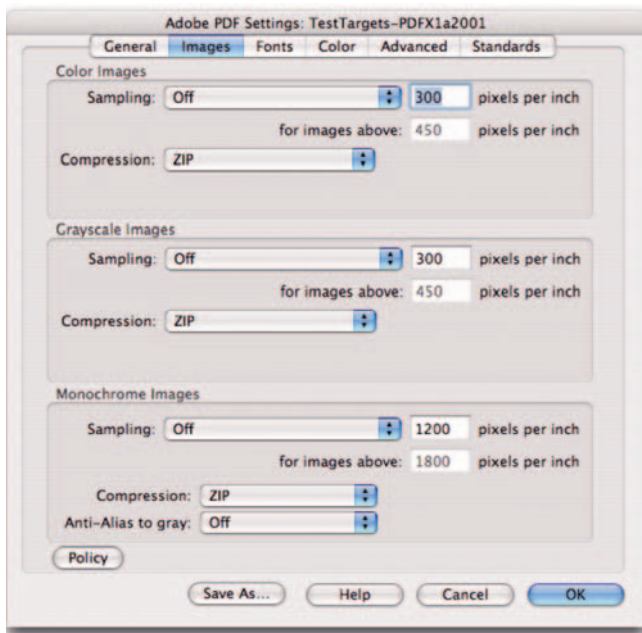


Fig. 6: Adobe Acrobat Distiller Images tab of the Adobe PDF Settings dialog box

6.5 In the Fonts tab, Fig. 7, the Embed all fonts check box must be selected. The PDF/X-1a:2001 standard requires fonts to be embedded.

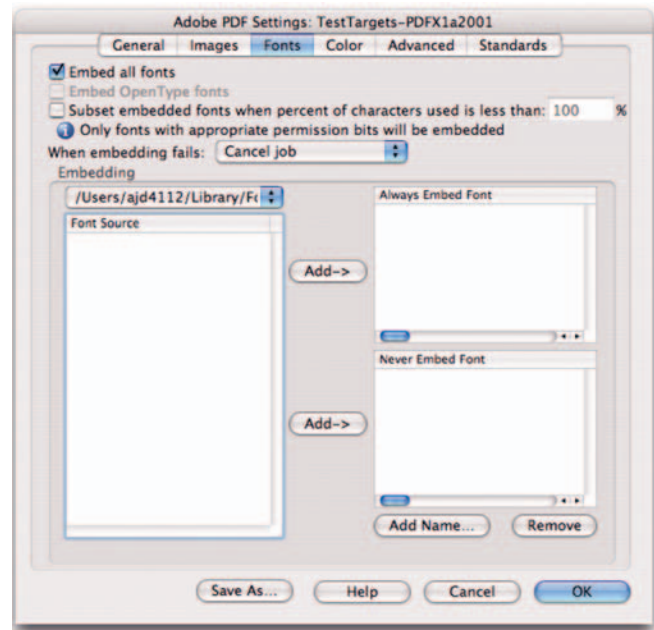


Fig. 7: Adobe Acrobat Distiller Fonts tab of the Adobe PDF Settings dialog box

6.6 In the Color tab, Fig. 8, the Settings File option should be set to none and the Color Management Policies should be set to “Leave Color Unchanged.” Distiller does not need to perform any color conversions; all required conversions took place in InDesign at the PostScript generations stage.

6.7 In the Advanced tab, Fig. 9, there are a number of options. While most of these options are workflow

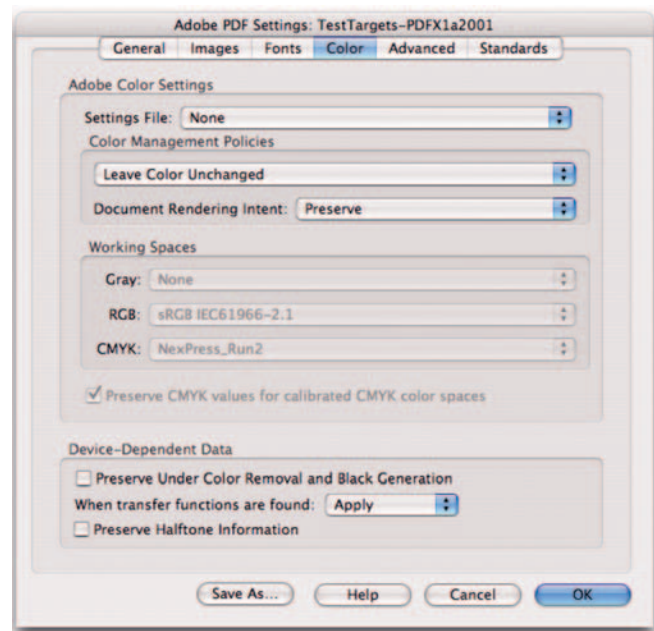


Fig. 8: Adobe Acrobat Distiller Color tab of the Adobe PDF Settings dialog box

specific and do not have an effect on the validity of a PDF/X1a:2001 file, the Allow PostScript XObjects must be unchecked. The PDF/X1a:2001 standard does not allow PostScript XObjects. The options that were selected are based on the recommendation of the print provider.

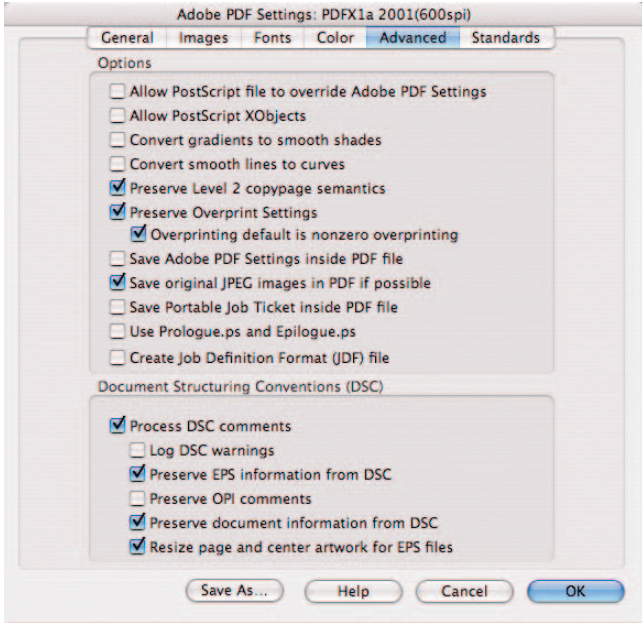


Fig. 9: Adobe Acrobat Distiller Advanced tab of the Adobe PDF Settings dialog box

6.8 In the Standards tab, Fig. 10, the Compliance Standard option must be set to PDF/X-1a (Acrobat 4.0 Compatible). The When not compliant option should be set to Cancel job. This setting stops the generation of the PDF when something has gone wrong. The Output Intent Profile Name should be set to the Device CMYK ICC profile. For the Test Targets workflow, this is the

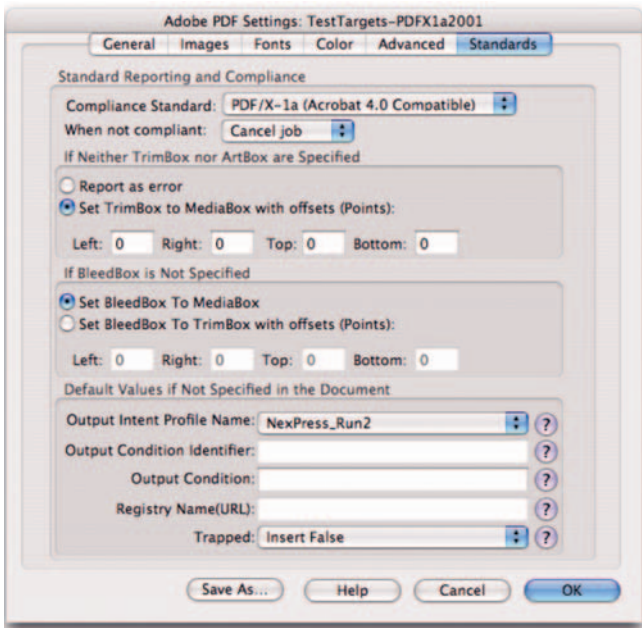


Fig. 10: Adobe Acrobat Distiller Standards tab of the Adobe PDF Settings dialog box

Kodak NexPress 2100 ICC profile.

6.9 The new settings can now be saved by selecting the Save As... button. Once the setting is saved, the Adobe PDF Settings dialog box can be closed by selecting OK.

### Conformance testing

To ensure the workflow created files that conform to the PDF/X1a:2001 standard, a test form was created to test the workflow out.

The test form contains various elements selected to represent the a *Test Target* InDesign file. These include the IT8.7 Basic target and the ISO SCID N7A (Three Musicians) legacy CMYK images as well as an image converted from RGB to CMYK in Adobe Photoshop (bird image), an Encapsulated PostScript (EPS) file created in Adobe Illustrator (neutral quad-boxes), and elements created in Adobe InDesign (CMYK SID Color bars, 50% K-only bar).

The InDesign file then went through the workflow described above. After distilling the PostScript file, the log file was examined to determine if any errors or warnings occurred.

Acrobat Distiller's log file, shown in Fig. 12, from the PDF generation of *Test Targets* PDF/X Test Form reported no warnings or violations. The file was then tested using the Enfocus PitStop Professional Adobe Acrobat plug-in.

```
<PDFX ISO="15930-1:2001"
COMPLIANT="true">
PDF/X Compliance Report
1. Summary
Warnings: The total found in this
document was 0.
Violations: The total found in this
document was 0.
No problems were found in the document.
This document passes PDF/X-1a:2001
compliance checks.
</PDFX>
```

Fig. 12: Distiller Log File

The Enfocus PitStop Professional Adobe Acrobat plug-in, Fig. 13, extends the Acrobat application by adding advanced preflighting, document editing, and verification functionality. This includes functionality to verify the

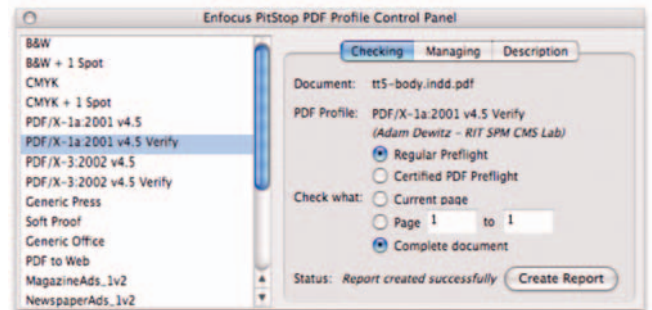


Fig. 13: Enfocus PitStop Professional PDF Profile Control Panel

conformance to the PDF/X-1a:2001 standard using a PitStop Profile.

PitStop profiles are a set of rules that can be used to check a PDF document for desired traits. PitStop includes a profile that verifies if a PDF file conforms to the PDF/X-1a:2001 standard. This report was run on the Test Targets PDF/X Test Form. The resulting report stated:

“No Errors or Warnings.”

This analysis provides evidence that workflow described in this paper generates valid PDF/X-1a:2001 while still supporting existing design and prepress requirements of the *Test Targets* journal.

### User Procedures

Adobe InDesign and Adobe Acrobat Distiller settings are saved to ensure standardization and portability across user computer workstations. These settings are created by the workflow architect or by group consensus. In an effort to standardize the various software application settings, the required color, printer, and PDF job settings for Test Targets 5.0 were created and then saved to file.

The creation of standard operating procedures (SOPs) and their use in publication production reduces the chance of user idiosyncrasies causing production errors such as using the wrong print driver or print settings when preparing a publication for print. A simple SOP was created to guide the use of the software application settings.

### Using Software Application Settings

1. Open Adobe Acrobat Distiller 7.0.
  - 1.1 Load custom joboptions file for Test Targets 5.0
2. Open Adobe InDesign.
  - 2.1 Load Color Settings
  - 2.2 Load Printer Presets
3. Open InDesign document. Add or edit contents.
  - 3.1 When saving the InDesign document, append the file name with a incremental value. E.g. TT5\_Draft\_1 becomes TT5\_Draft\_2.
4. Save the InDesign document as a PostScript file using the custom settings loaded in 2.2
5. Generate the PDF/X-1a:2001 file using Adobe Acrobat Distiller.

## Conclusion

While the PDF/X standards are new and still evolving, it is possible to use today's desktop publishing tools to create print-ready PDF files that conform to the PDF/X-1a:2001 standard without making major changes to current workflow requirements.

The production of *Test Targets 5.0* contains two different print production paradigms. The first paradigm follows a traditional print publications workflow. The second paradigm follows a system analysis workflow where the goal is to send a system a known stimulus and measuring the response to gain a better understanding of how the system works and what can be done to optimize it.

The scholarly article component of *Test Targets 5.0* follows a traditional print publication workflow and could utilize the PDF/X best practices described by Adobe Systems and the Ghent PDF Workgroup. The Gallery of Visual Interest and Test Forms components of the journal allow for qualitative and quantitative analysis of the print production process. These two components are unique to the *Test Targets* journal and require the creation of a hybrid print production workflow that takes advantage of emerging workflow standards while retaining the goals of the testing color reproduction systems. This article describes how a hybrid workflow was created for the production of this journal that embraced both print production paradigms and created data exchange files that conform to PDF/X-1a:2001.

The next logical step for the *Test Targets* journal is to adopt a PDF/X-3 workflow that supports the inclusion of CIELAB, RGB, CMYK, and spot colors. This standard is capable of supporting both the publishing and test targets print production paradigms used in the creation of this journal.

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