

Automation Engine

PDF/X-4 in Automation Engine

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1. Automation Engine Passed the VIGC PDF/X-4 Audit

In April 2012, Esko Suite 12 passed the PDF/X-4 audit of the VIGC (Vlaams Instituut voor Grafische Communicatie). In this test, correct rendering of a number of PDF/X-4 files in output oriented workflows was verified by the VIGC. These test files were specially designed to illustrate features of the PDF/X-4 specification.



The test files included the Altona V2 test suite (see <http://www.eci.org/en/projects/ats>) and the GWG output suite (<http://www.gwg.org/ghentoutputsuite.phtml>).

For more information, see <http://www.vigc.org/vigc-pdfx-4-audit/>.

2. What is PDF/X-4 And Why Should You Care?

PDF/X-4 is an ISO standard (see www.iso.org). The first version was released in 2008 as ISO 15930-7:2008. An updated version ISO15930-7:2010 was released in 2010. The title of the standard document says “Complete exchange of printing data (PDF/X-4) and partial exchange of printing data with external profile reference (PDF/X-4p) using PDF 1.6”.

The goal of the PDF/X-4 standard is the same as the goal of its predecessors PDF/X-1a and PDF/X-3 i.e. to specify a data format that gives 100% reliability and predictability when sent to a printer. For this purpose the file is self-contained (it does not rely on resources that are not contained in the file e.g. system fonts) and all ambiguous features from the PDF specification that could cause rendering differences between systems are forbidden. You could see PDF/X as a reliable subset of PDF.

Several segments of the printing industry, packaging being a noteworthy exception, mandated the use of PDF/X-1a or PDF/X-3 for sending print ready data to a printer.

PDF/X-1a and PDF/X-3 are based on PDF1.3. PDF/X-4 is based on PDF1.6. The 2 most important implications of this upgrade to a higher PDF version are:

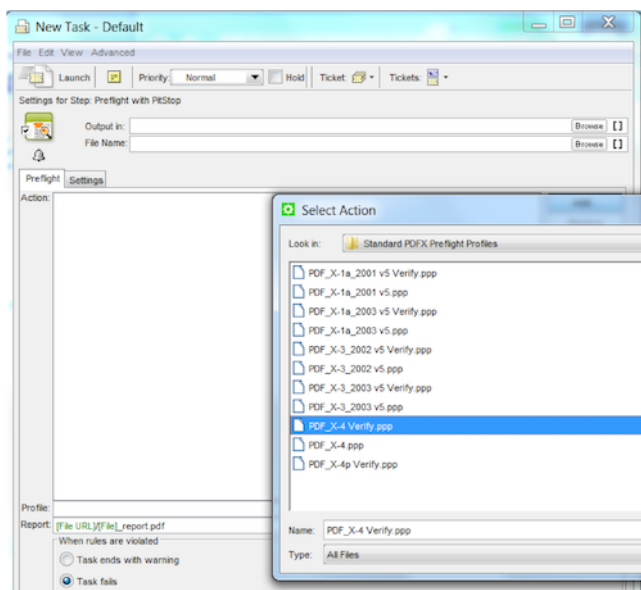
- Use of transparency is allowed in PDF/X-4
- Usage of layers (more precisely PDF OCGs or optional content groups) is allowed in PDF/X-4

At the time of writing printing industry associations are pushing the adoption of PDF/X-4 as the standard data exchange format for different segments including packaging.

3. How to Check If a File Is PDF/X-4 Compatible

Since v12, the **Preflight with PitStop** task in Automation Engine can be used with the profile **PDF_X-4 Verify.ppp** to verify that a PDF is PDF/X-4 compliant.

If you use the profile “PDF_X-4.ppp”, the task will verify and potentially also fix the PDF so that it becomes a PDF/X-4 compliant file.



4. Processing a PDF/X-4 File

Taking a simple workflow as an example, how can you make sure the output is PDF/X-4 compatible?

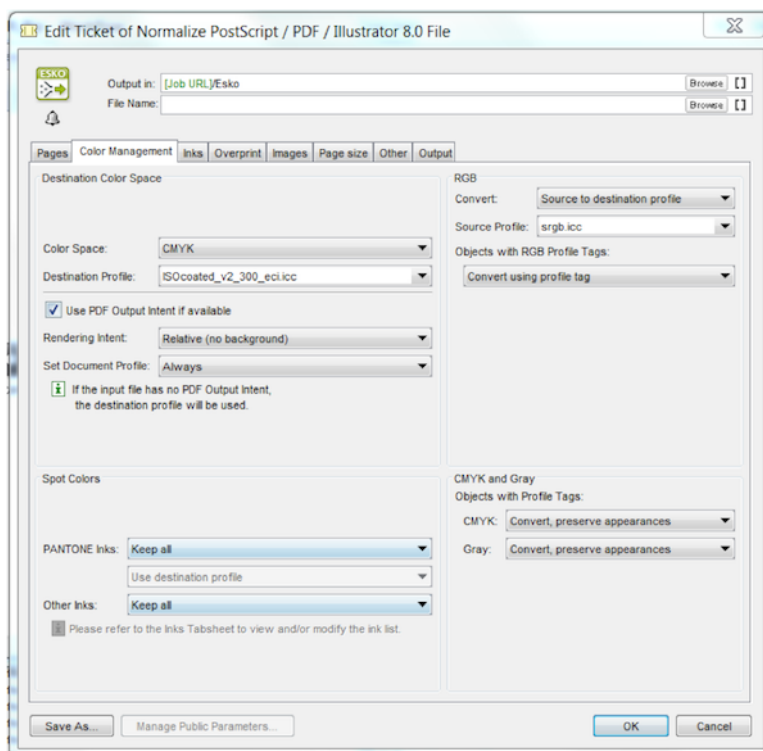
A sample workflow with PDF/X-4 files



PDF/X-4 compatibility depends on the settings for color management in the **Normalize** step that will convert the incoming PDF/X-4 file to an Esko Normalized PDF.

Normalization settings

Below is a screen shot of the Automation Engine ticket. Similar settings are available in PackEdge and Plato.



The most important settings for PDF/X-4 compatibility are:

- **Use PDF Output Intent if available** must be enabled. A PDF/X-4 file always contains a CMYK ICC profile that defines the CMYK color space of the intended output device. This profile must be used to convert all CIE based objects in the PDF (Lab, RGB with attached ICC profile, CMYK and Gray with attached ICC profile) to CMYK.

Note: For PDF/X-4 files the destination profile selected in the drop down list does not matter - there is always an output intent profile for PDF/X-4 files.

- **Convert objects with RGB Profile Tags** should be set to **Convert using profile tags**. RGB objects having an attached ICC profile have to be converted from RGB to CMYK using the RGB ICC profile and the CMYK output intent profile.

Note: PDF/X-4 forbids the use of RGB objects without attached ICC profile (DeviceRGB).

- **CMYK and Gray objects with Profile Tags** should both be converted using the **Convert, preserve appearances option**. CMYK objects having an attached ICC profile have to be converted from source CMYK to output intent CMYK using the attached CMYK ICC profile and the CMYK output intent profile. Gray objects having an attached ICC profile have to be converted from source Gray to output intent CMYK using the attached CMYK Gray profile and the CMYK output intent profile.

Note: PDF/X-4 forbids the use of CMYK objects with an attached ICC profile that is identical to the output intent profile to avoid unwanted color conversions that can negatively impact separations.

Note: PDF/X-4 allows use of untagged gray objects (DeviceGray). In this case gray is mapped on the black channel of the CMYK output space.

5. Exporting a PDF/X-4 File

This example workflow shows how to generate PDF/X-4 files in Automation Engine 14.1 and higher:



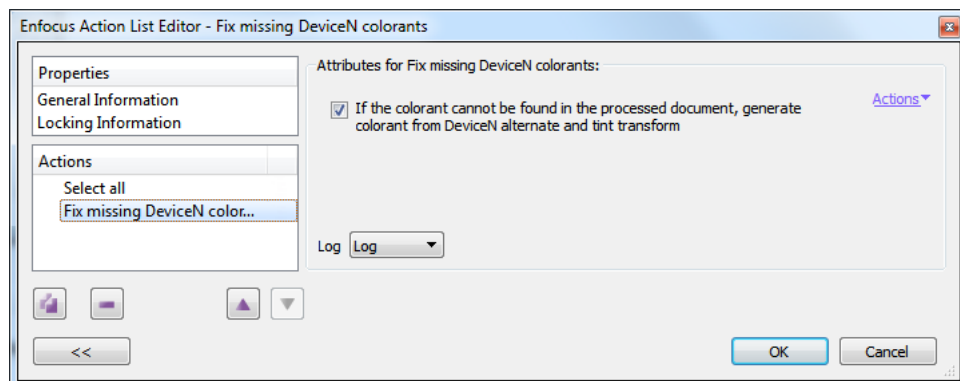
- The **Export to PDF** step makes a Normalized PDF self-contained (embedding all the external references).
- The **Preflight with PitStop** step uses a `PDF_X-4.ppp` profile to convert the PDF into a PDF/X-4 document.

A PDF/X-4 Requires a Colorants Dictionary

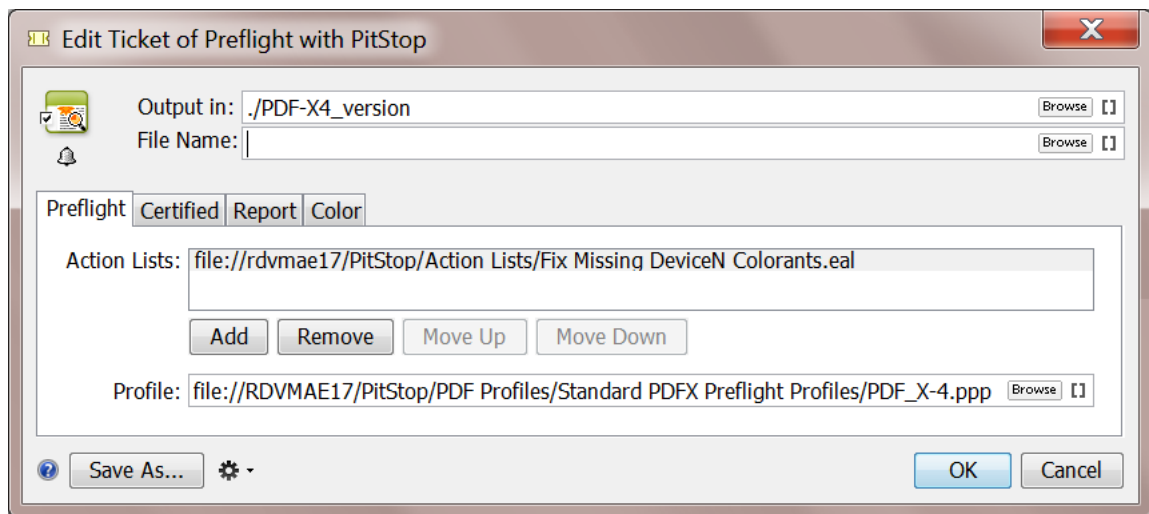
To create the **Colorants** dictionary, which is required for a PDF-X/4, you need to apply the action list named "**Fix missing DeviceN colorants**".

Follow these steps to do this:

1. In the **PitStop Profile Editor**, create a **PitStop Action List** that uses the actions "**Select All**" and "**Fix missing DeviceN colorants**". For the 'Fix' action, make sure you activate the option that generates the colorants when they cannot be found. Save this action list, for example as "`Fix missing DeviceN colorants.eal`".



2. In the **Preflight with PitStop** task, use **both** the created **Action List** "`Fix missing DeviceN colorants.eal`" and the standard **Profile** "`Standard PDFX Preflight Profiles/PDF_X-4.ppp`".



Note: This only works with PitStop 13.x or higher, which was first built into Automation Engine 14.1.

Note: You can achieve the same result when you embed the action list into the profile. Your **Preflight with PitStop** ticket then only needs to trigger that customized profile.

When this 'fix' is not done while creating the PDF/X-4, you may see this 'INFO' message:

```
INFO: PitStopTask.Message.LogError(PDF/X-4 : DeviceN color space contains spot colors that are not defined in its Colorants dictionary)
```

6. Limitations and Potential Problems in PDF/X-4 Workflows

PDF/X-4 allows usage of objects that require color conversions in a PDF (e.g. Lab, RGB with ICC profile, CMYK with an ICC profile other than the output intent profile, Gray with ICC profile, etc...). PDF/X-4 also stipulates clear rules on how these objects should be converted from their color space to the output intent color space to obtain predictable results.

However there are a number of potential problems:

- **Color conversion based on ICC profiles can result in output separations that generate bad print quality.** Some examples:
 - An object defined in a Gray color space with attached ICC profile will be converted to CMYK using the output intent profile. The output separations will most likely contain C, M, Y and K values. For small text on print processes with imprecise register this is a problem.
 - Conversions for objects defined in Lab, RGB or CMYK can result in small dots that are difficult to print in flexo.
 - Conversion of an object in CMYK other than the output intent can result in CMYK values with different black generation and a TAC (total area coverage) that exceeds the limit for the intended printing process.

The user should consider if this is a problem in his specific workflow and if so either avoid the usage of objects requiring color conversions in incoming file or insert steps in the workflow to correct such situations.

- A method called **Black Point Compensation was introduced in Adobe products to improve color conversions.** (See <http://www.color.org/AdobeBPC.pdf>). Applying this method can give very different results especially for RGB to CMYK conversions. Unfortunately this method is not part of the PDF or the PDF/X-4 specification. Some vendors have implemented it, others not. This breaks the intended predictability of PDF/X-4 workflows.

Note: Since Suite 12, Black Point Compensation was introduced in such a way that it is compatible with Adobe applications.

The user should verify that systems in his workflow use Black Point Compensation in a consistent way.

- In some **applications such as Adobe InDesign, it is possible to specify that transparency blending has to be done in RGB instead of CMYK** even if the file is intended for print. The PDF/X-4 specification allows this, however tests of the VIGC and others have revealed that implementation of this feature is not implemented or implemented in different ways in the most popular applications available.

To achieve predictable results, the user should avoid usage of blending color spaces other than DeviceCMYK in incoming files.

Note: The Altona V2 test suite contains patches with transparency blending spaces other than CMYK. Those patches give inconsistent results in the majority of the systems on the market.

Because of the potential pitfalls related to color management in PDF/X-4 the Ghent PDF Work group (www.gwg.org) is working on the GWG2012 preflight profiles for different industry segments. The GWG2012 preflight profiles will prohibit usage of objects requiring color management and the usage of transparency blending spaces other than CMYK.