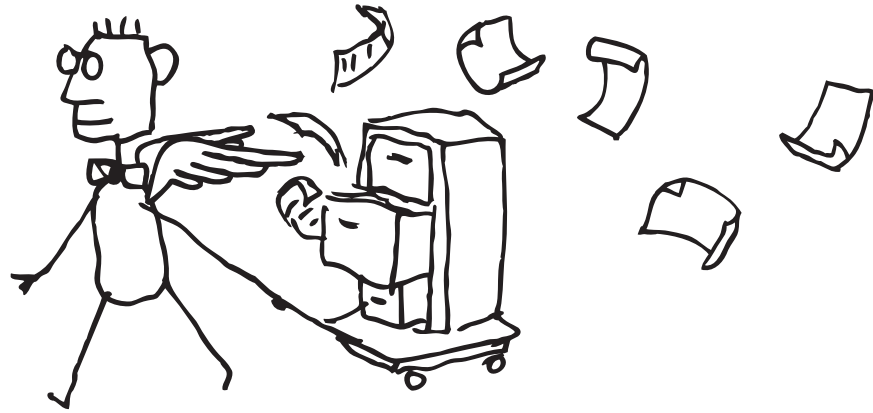


PDF/A with PDFlib Products

 **PDFlib®** Whitepaper



The PDF/A format specified in the ISO 19005 standard strives to provide a consistent and robust subset of PDF which can safely be archived over a long period of time, or used for reliable data exchange in enterprise and government environments. This whitepaper discusses features of PDFlib products for creating PDF/A output suitable for long-term document archival.

PDF/A-1a and PDF/A-1b

PDF/A-1, formally the international standard ISO 19005-1, is targeted at reliable long-time preservation of digital documents. The standard is based on PDF 1.4 and imposes some restrictions regarding the use of color, fonts, annotations, and other elements. There are two flavors of PDF/A-1, both of which can be created and processed with PDFlib products:

- ▶ ISO 19005-1 Level B conformance (PDF/A-1b) ensures that the visual appearance of a document is preservable over the long term. PDF/A-1b ensures that the document will look the same when it is viewed or printed some time in the future.
- ▶ ISO 19005-1 Level A conformance (PDF/A-1a) is based on level B, but adds crucial properties from »Tagged PDF«: it requires structure information and reliable text semantics in order to preserve the document's logical structure and natural reading order. Simply put, PDF/A-1a not only ensures that the document will look the same when it is used in the future, but also that its contents (semantics) can be reliably interpreted and will be accessible to physically impaired users.

When PDF/A-1 without any conformance level is mentioned below, both conformance levels are meant. The PDF/A-1 implementation in all PDFlib products is based on ISO 19005-1:2005 plus Technical Corrigendum 1 (published by ISO in 2007) and all relevant TechNotes published by the PDF/A Competence Center.

PDF/A requirements and restrictions

PDF/A requires certain PDF features and prohibits certain others. For example, in order to guarantee exact text reproduction, all fonts used in a document must be embedded; in order to guarantee exact color reproduction all colors must be specified in a device-independent way. Metadata must be embedded using the XMP format; encryption must not be used.

In addition to these straight-forward requirements, however, PDF/A requires various other PDF features which are more subtle (e.g. certain entries in font data structures), and prohibits some critical structures (e.g. certain combinations of TrueType fonts and encodings). There are many aspects which must be implemented and checked by software developers before they arrive at fully standard-conforming PDF/A products. PDF/A is much more than simply »PDF with embedded fonts«!

PDF/A support in the PDFlib product family

PDFlib provides application developers with a toolkit which allows the following PDF/A-related operations:

- ▶ Create PDF/A from scratch, e.g. based on text from a database
- ▶ Convert raster images (e.g. scans) to PDF/A

- Process existing PDF/A documents, e.g. merge or split
- Create PDF/A-1a with structure information (Tagged PDF)
- Attach XMP metadata to the generated documents, including the subtle topic of XMP extension schemas (see below).

All of these operations can be implemented with simple PDFlib function calls. Sample code for a variety of programming languages and development environments is provided with the PDFlib distribution. Additional programming techniques for PDF/A are available in the PDFlib Cookbook. Due to the significant overlap between PDF/A and the PDF/X standard (ISO 15930) for the graphic arts industry, the PDF/A support in PDFlib took advantage of the fact that we've been supporting various flavors of PDF/X for several years. To facilitate font embedding as required by PDF/A, the Japanese Resource Kit for the PDFlib family includes common Japanese fonts with an embeddable license which is included in the software license, as well as country-specific ICC profiles, CMaps, and documentation for Japanese users.

Creating PDF/A-conforming output

Creating PDF/A-conforming output with PDFlib is achieved by the following means:

- PDFlib automatically takes care of several formal settings for PDF/A, such as PDF version number and required XMP identification entries.
- The PDFlib client program must explicitly use certain function calls and options (e.g. for font embedding).
- The PDFlib client program must refrain from using certain other function calls and option settings (e.g. encryption).

If the PDFlib client program obeys to these rules, valid PDF/A output is guaranteed. If PDFlib detects a violation of the PDF/A creation rules it will throw an exception which must be handled by the application. No PDF output will be created in case of an error; there is no danger of creating non-conforming output if an error occurs. Details of required and prohibited operations are discussed in the PDFlib documentation.

Device-independent color specification

In order to maintain consistent color reproduction, PDF/A requires the use of device-independent color, usually achieved via ICC profiles or CIE Lab color specifications. The optional output intent describes the color characteristics of the document. While these concepts are widely used in the graphic arts industry, enterprise PDF developers are not necessarily familiar with color management. In this situation PDFlib makes it easy to create device-independent output regardless of the source of input data:

- PDF/A output can be created with or without an ICC profile in the output intent.
- In the common case of black text PDFlib will automatically choose an appropriate color space (Lab or DeviceGray) depending on whether or not an ICC profile for the output intent has been specified.
- External ICC profiles and profiles embedded in images allow fine-grain color control.
- ICC profiles for common application scenarios are provided for free download so that valid PDF/A output can be achieved quickly.

Raster images, e.g. TIFF and JPEG, play a vital role in document creation. Scanned paper documents and photographs from digital cameras are common examples of raster image data in document workflows. While in modern workflows raster image data may already be device-independent (usually by means of an embedded ICC color profile) and thus are PDF/A-compatible, legacy image data will in many cases be device-dependent, such as black-and-white or RGB scans without any associated ICC profile. PDFlib supports both situations:

- ICC profiles embedded in raster image files will be honored.
- External ICC profiles can be applied to an image.
- As a fallback solution for legacy data of unknown origin PDFlib contains a built-in sRGB ICC profile which matches many hardware and software environments.
- By specifying an ICC profile for the output intent, device-dependent image data can be used without applying an ICC profile to the images.

The PDFlib documentation discusses PDF/A color strategies for common application scenarios.

XMP made easy

PDF/A mandates the use of XMP metadata for storing information about a document inside the PDF itself. XMP provides a powerful and flexible framework for storing standard and custom metadata properties (see also our separate whitepaper on XMP). If you already use XMP metadata in your workflow, you can create full XMP streams which PDFlib will integrate into the PDF/A output. However, developers who are not familiar with XMP are not required to delve into this vast topic. PDFlib will cre-

ate the XMP output required for PDF/A, and will automatically map classic document info fields to the corresponding XMP constructs as mandated by the standard. As a result, developers who wish to do so can leverage the power of XMP, while PDFlib's automatic XMP generation will be adequate in situations with simple metadata requirements.

XMP extension schemas

XMP is extensible by its very nature, i.e. company- or industry-specific metadata requirements can be met by constructing XMP extension schemas. PDF/A supports this concept, but for ease of future retrieval mandates that a machine-readable description of the schema must be embedded in the document according to certain rules. PDFlib products were the first to support XMP extension schemas for PDF/A. PDFlib validates user-supplied XMP metadata including extension schemas in order to guarantee that the generated output fully conforms to PDF/A. More details on XMP in PDF/A can be found on www.pdflib.com.

Processing existing PDF/A documents

Additional rules apply when importing pages from existing PDF/A-conforming documents. For example, in Adobe Acrobat it is very easy to combine two PDF/A documents such that the resulting output document no longer conforms to PDF/A (without any warning). When dealing with existing PDF/A documents, PDFlib+PDI carefully examines the PDF/A properties of all input and output documents to make sure that the output will still conform to PDF/A. For additional control the output intent of an imported document can be copied to the output PDF, effectively cloning the PDF/A color properties of an existing document. Similarly, XMP metadata from imported documents can be cloned or merged.

Creating PDF/A-1a with Tagged PDF

PDF/A-1a can be regarded as PDF/A-1b plus Tagged PDF: it requires structure information for the document and imposes certain conditions on fonts to make sure that the text can be interpreted properly. As a result, PDF/A-1a documents are fully accessible for users with physical disabilities. In addition to the visual appearance they also preserve the meaning of its contents.

PDFlib's support for PDF/A-1a is based on the features for producing Tagged PDF: each content item can be placed at a particular location in the document's structure tree; content items which are not relevant for the document structure (e.g. headers and footers, pagination) can be tagged as artifacts which means that they will be ignored when repurposing the document (e.g. when the document is read aloud by software, or converted to some other format). Alternative text can be attached to images; the text can be read to visually challenged users by Acrobat.

Note that you will need detailed knowledge about the document's logical structure in order to create Tagged PDF. PDFlib will take care of the PDF-related details, but it cannot infer the document structure from its contents.

Based on the existing Tagged PDF support, PDFlib can produce output which conforms to PDF/A-1a.

PDF/A-conforming document processing with PDFlib PLOP

PDFlib PLOP offers several PDF processing features, all of which are PDF/A-aware. This means that processing PDF/A input documents will either result in PDF/A-conforming output if the processing can be accomplished in a standard-conforming manner, or an error message otherwise. Some examples:

- You can use PLOP to inject XMP metadata in existing PDF/A documents. Since PLOP supports XMP extension schemas for PDF/A it can be used as a post-processing step for existing documents, or to leverage XMP extension schemas even if the software for creating the documents in the first place does not support it.
- Trying to encrypt PDF/A documents will result in an error message since encryption is not allowed in PDF/A. You must explicitly sacrifice the PDF/A status in order to encrypt a PDF/A document with PLOP.

Digital signatures for PDF/A with PDFlib PLOP DS

PLOP DS includes all features of PDFlib PLOP, and in addition applies digital signatures to PDF documents. Since PLOP DS is aware of the subtle PDF/A rules for signature fields, it signs PDF/A documents in a way which conforms to the PDF/A standard.

Validating PDF/A

When implementing a standards-based workflow it is good practice to deploy tools for validating the results against the standard. With respect to PDF/A there are software tools available which check whether or not a given PDF document conforms to the ISO standard.

As one of the founding members of the PDF/A Competence Center PDFlib GmbH was actively involved in the design and implementation of the Isartor test suite for PDF/A-1 (see www.pdfa.org). The Isartor suite is the primary benchmark for PDF/A validation tools. While PDFlib GmbH offers products for generating and processing PDF/A documents, we do not offer tools for validating PDF/A or converting PDF documents to PDF/A.

Since we did a lot of PDF/A conformance testing as part of our internal Q/A process, we conducted a comparative review of all available PDF/A validators. The results have been published in the »Bavaria Report on PDF/A Validation Accuracy« (available on our Web site). The Bavaria Report had significant impact on the consolidation process of PDF/A validators.

PDF/A created with PDFlib products has been checked against the Preflight tool in Adobe Acrobat 9 as well as all other available PDF/A validators to make sure that not a single aspect of the standard is violated.

Moving on to PDF/A-2

The PDF world advanced a lot since PDF/A-1 has been published in 2005. Among many other milestones, PDF 1.7 has been standardized as ISO 32000-1 in 2008. In order to make various new PDF features usable in PDF/A workflows, additions to the archiving standard are in the works: PDF/A-2 (ISO 19005-2) will include many useful additions which are not available in PDF/A-1. These additions include important topics such as JPEG 2000 compression, optional content (layers), transparency, PDF Portfolios and others. It is important to understand that PDF/A-2 will not make PDF/A-1 obsolete or force anyone to migrate to the newer version – after all, this would be absurd for a standard which is targeted at long-time preservation!

ISO 19005-2 is expected to be published in 2010. PDFlib GmbH plans to support PDF/A-2 in its products as soon as the final standard is available.



PDFlib GmbH

Franziska-Bilek-Weg 9
80339 München, Germany
phone +49 • 89 • 452 33 84-0
support@pdflib.com
www.pdflib.com/developer/pdfa

PDFlib GmbH is completely focused on PDF technology. Customers worldwide use PDFlib products since 1997. The company closely follows development and market trends, such as ISO standards for PDF. PDFlib GmbH products are distributed all over the world with major markets in North America, Europe, and Japan.



PDF/A Competence Center

www.pdfa.org

The ISO standard PDF/A is generating enormous interest in the market. The PDF/A Competence Center was founded in 2006 as an international association to address the high demand for information about PDF/A and to promote the exchange of ideas and experience. The combined knowledge of numerous PDF/A experts is available to interested parties. The association conducts seminars and conferences and contributes to further standardization.

PDFlib GmbH is one of the founding members of the PDF/A Competence Center.