



PDF: supporting document interchange in the collaborative engineering environment

Extending the “lingua franca” of the web to engineering documents

Executive summary

PDF has become the standard file format for convenient, reliable electronic document distribution, sharing and printing, particularly over the Internet. The key benefit of PDF files is that they always retain the original “look and feel” when displayed or printed. Originally developed for the office environment, PDF is gaining increasing acceptance in the wide-format area. At a time when teamworking and collaborative engineering are keywords, PDF supports working processes by enabling accurate document interchange between people in many different environments.

PDF: supporting document interchange

Contents

1. “Electronic paper” and web-enabled document interchange
2. Document usage needs and trends in the engineering environment
3. How PDF addresses the unique needs of engineering
4. Building a PDF-oriented engineering process
5. How Océ is leading the way with PDF in engineering

1. “Electronic paper” and web-enabled document interchanges

Adobe’s Portable Document Format (PDF) is rapidly gaining acceptance as a global standard file format for electronic document distribution, printing and archiving. Files in the PDF format serve as reliable “digital masters”: they are easy to exchange, view and print. Key to this acceptance is the fact that Adobe PDF files will consistently reproduce in full—both on-screen and when printed. The “look and feel” of the original document is maintained, including all the formatting, fonts, colours, embedded images and graphics of the file created by the original application. But unlike the original application file, the PDF document is platform-independent: it can be shared, viewed and printed by anyone using the Adobe® Acrobat® reader, which is freely available. To create PDF files, Adobe offers the complete Adobe® Acrobat® software package.

“Electronic paper”: a new class of documents

While PDF was becoming widely used, the Internet was also gaining worldwide acceptance. Since then, the convergence of the web and PDF technologies has led to the widespread adoption of PDF as a reliable, universal standard for document display, printing and delivery via the Internet.

Largely as a result of the acceptance of both PDF and the web, a new class of documents—“electronic paper”—has emerged. These are changing the nature of business communications, combining the benefits of the familiar printed page with the power of digital technology.

Initially PDF provided an integrated “view & print” solution for the office environment. This has now evolved and broadened in scope to “view & distribute”. Documents from any source can be

converted and “captured” in PDF form, and can be viewed and reproduced correctly by anyone, anywhere, with any mainstream systems and printers. Throughout their use, PDF document files retain all the knowledge and content embedded in the original document, which is why they are ideal for enterprise-wide use.

Universal medium for document interchange

In this way Adobe PDF provides a universal medium for document interchange which is truly independent of location, platform, application, distribution medium and output device. By overcoming the complexities and incompatibilities imposed by all these variables, PDF has gained rapidly increasing acceptance and popularity. The impact of PDF is underlined by the fact that it has become the standard for web-based document delivery, with over 300 million downloads of the freely available Acrobat® reader.

2. Document usage needs and trends in the engineering environment

PDF was initially developed as a solution for document interchange in the office and corporate environment. However the benefits of convenient and consistent interchangeability are just as relevant in the engineering environment. Here, too, documents are generated using many different applications and platforms. These documents later have to be shared with and used by people in other departments and functional areas, for example, project planning, purchasing, manufacturing and many others.



PDF: supporting document interchange

Sharing information is mission-critical

Today, sharing engineering information is mission-critical, yet at the same time it has become more challenging because of trends like globalisation, collaborative design, flexible and virtual project teams, supplier partnerships, extended enterprises etc. Also, the ever-increasing pressures on costs, turnaround time and time-to-market are constant drivers for cost-effective and virtually instant ways to share information.

Technology changes and challenges

In today's business environment, enterprises are faced with major technology changes and challenges across several fronts. These have a far-reaching impact on their document processes and the way they share information, for example:

- The transition from analogue documents (hard copy) to digital documents (electronic files)
- Implementing new, enterprise-wide concepts in document management, archiving and sharing
- Addressing new organisational forms and business models that shape the way people work together in the design & engineering environment

Against this background, key enablers are today's web-enabled working methods and corporate ITC infrastructures: global networks are now a reality, not only at corporate level but also at project and workgroup level.

Fast, consistent access to information

Whatever the working environment and IT infrastructure, the essential requirements of users are the same: fast document retrieval, quick and convenient delivery to the point of use (whether by "push" or "pull"), and fast, consistent access to stored information. But today there are more users than ever before, all working in different departments, areas, disciplines and corporate frameworks. Not all these users need or have access to the native applications with which documents were created (e.g. MCAD). In most cases all they need is to "view & distribute" already released documents, and sometimes to annotate them. Access by all these users has to be facilitated, but also needs to be controlled. Who is allowed to view a document? To print it? To edit it? Questions like these need to be addressed and the appropriate levels of authorisation defined and allocated.

Secure, long-term archiving

Another key issue is secure, long-term archiving. As enterprises move towards all-digital working methods, this will increasingly be dealt with by electronic solutions. Creating an effective and stable archiving system also demands a universal format that is independent of changing IT platforms and applications.

The chosen archiving system and file format must also be "web-friendly", so that documents can be accessed and viewed via the Internet using a normal web browser, and can then be downloaded if required for local printing and distribution.

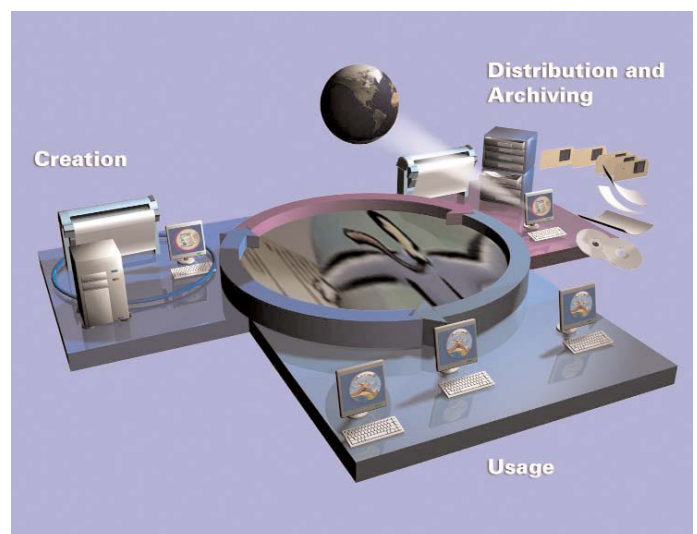
Future-proof document accessibility

Such an archiving system must ensure consistent document accessibility in the future—not just next month or next year, but possibly ten or even fifty years from now, depending on organisational needs, service commitments and legal requirements. This cannot be achieved simply by storing application files. To achieve this demands a durable, platform and application-independent document format that will remain accessible regardless of changes in systems, applications and environments.

Future-proof also means having a format that is designed to accommodate evolving technology changes in security, workflow and multi-media.

Documents as "electronic paper"

In other words, documents are stored as "electronic paper" that is always accurately and consistently reproducible in every working environment. This document format will offer all the same functionalities in the digital environment as microfilm aperture cards in the analogue environment. But at the same time a number of functional enhancements can be provided. For example, the time-consuming searching and retrieval of information in a hard-copy environment can be eliminated by electronic searching of digital documents, in which documents can be searched on text or a wide range of other attributes. This capability can play a key role in meeting today's knowledge management needs which call for effective sharing and re-use of information.



PDF: supporting document interchange

3. How to address these changing needs in the design & engineering environment

As already discussed, selection of the most appropriate document format is crucial to ensure optimal support for the changing needs and working processes in the design & engineering environment. This is a choice that will have significant long-term consequences because of the need for a universal and stable format around which enterprises can build their document management, archiving and distribution systems and processes.

Selecting the right file format

A number of so-called “universal” file formats have been proposed at various times, e.g. TIFF and HPGL, as well as PDF. All these formats meet some of the needs for document interchange, but PDF best meets the needs of the engineering environment in the following ways.

- Mixed content capability: PDF provides a “final form” page fidelity standard that retains all the layout, fonts, colours and other content attributes of complex documents, containing graphics, images, text and tables. In other words, PDF provides not only “WYSIWYG” but also “WYSIWYP” (“What You See Is What You Print”)
- PDF handles both vector and raster information. Vector data (e.g. text and other detailed information) is preserved during conversion into PDF (using the Adobe® Distiller® program), so it retains full detail sharpness and information content when zoomed
- Of all the proposed formats, only PDF makes text and other document attributes searchable. This is a primary need in digital archiving situations, and underlines the fact that just capturing a drawing by scanning is not enough! Searching can be by full text search, by document attributes or manually by viewing thumbnails, as well as the creation of searchable indices of PDF files using backend asset management tools.
- PDF can handle physical document sizes up to 200 x 200 inches. (more than 5 x 5 m). This is large enough for most engineering drawing and display graphics applications
- PDF is a structured and controlled format, with no proprietary implementations which can vary over time, and can lead to viewing and printing errors. This contrasts with the TIFF and HPGL standard
- PDF documents can be generated in different ways to fit in with specific situations and processes: for example by direct export from the CAD application, conversion from other formats (e.g. TIFF), scanned hard-copy documents via TIFF and scanning of hard-copy documents direct to an archive or network, including OCR
- PDF files can be secured with encrypted passwords, ensuring that confidential information can only be viewed or printed by authorised users. Also digital signatures can be incorporated, allowing PDF documents to meet legal requirements
- Although PDF does not allow editing, just as with hard-copy documents, annotations can be made by adding comments in the form of “sticky notes”. These annotations can be tracked, supporting collaborative engineering projects without the need to share and distribute native files
- PDF documents can be viewed and printed by all, using the freely available Acrobat reader
- PDF files are in general smaller than equivalent native files, saving on storage space and network communication load
- Only PDF is designed for the Internet – Of all the storage formats available, PDF is optimized for the web. Multi-page PDF files can be downloaded over the network concurrently with their display

PDF: supporting document interchange

4. Building a PDF-oriented engineering process

PDF is not only an ideal format for document interchange and archiving, it is also an excellent fit for every stage of the engineering document process: from creation through document management to document output. In addition, as an open standard PDF is subject to both in-house and third-party developments to add functionalities needed for trade-specific workflows and applications.

PDF brings numerous benefits to the engineering process:

- PDF files are small and self-contained
- They can be viewed, printed and archived readily at any location
- They are page and device-independent
- The ability to secure the contents of PDF files meets the need to protect confidential information
- The ability to add comments supports the review process

PDF at every stage of the engineering process

How does PDF fit into the various stages of the engineering process? In fact PDF is an excellent fit at every stage:

Document input/capture

- PDF files can be created within the CAD application
- Other electronic file formats can be converted to PDF
- Hard-copy documents can be scanned to TIFF files and then converted to PDF (including OCR)
- Original hard-copy documents can be scanned directly into PDF files where the systems used allow this to be done
- Indexing data, hyperlinks, content tables, thumbnails, XML data, security features etc. can be added to PDF files
- Multiple documents (e.g. PDF plot files, scanned PDF files, small-format PDF files, TIFF files etc.) can all be combined into

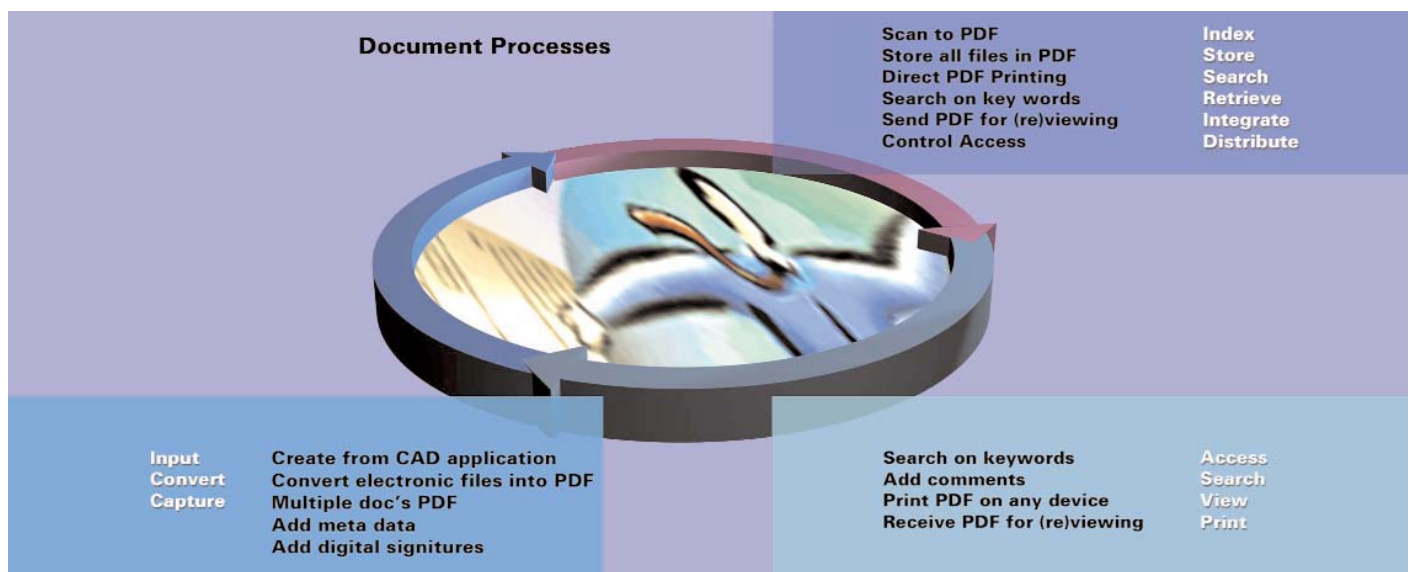
a single PDF file

Document management and archival

- All printable files can be stored in PDF form, including both small-format documents and engineering drawings
- Access to stored PDF files can be controlled, for example, view only or print only
- Files in the archive can be searched by full-text search, search on attributes or browsing thumbnails or searching an entire index of PDF files
- Comments or “sticky notes” can be added to PDF files. All comments on a document can be hosted on a central server, meeting ISO requirements for document integrity by ensuring that no changes have been made to the original document file
- The latest Acrobat® 5 version supports a collaborative reviewing process
- Digital signatures can be used to make PDF files into legal documents

Document distribution and output

- PDF files in an archive can be viewed and/or printed on any device and at any location, either on a network or via the Internet
- PDF files can be distributed for review and/or approval with the assurance of consistent, correct display and printing
- Documents can be distributed in the form of PDF files to multiple users using predefined mailing lists, for example, as e-mail attachments
- Multiple document sets can be created, including PDF files, when using job submission software that supports this function and printers with direct PDF support



PDF: supporting document interchange

5. How Océ is leading the way with Adobe PDF in engineering

Océ has committed itself to support Adobe PDF as the universal document interchange format for the engineering environment. By doing so, Océ recognises the need for both:

- a) High consistency and integrity of output documents
- b) The far-reaching impact of web-enabled working processes and enterprise models

In this way Océ intends to offer its engineering customers the same benefits of standardisation, consistency and interchangeability that are already widely accepted in the printing and graphic arts industries.

As a strategic partner of Adobe Systems, Océ can give its customers the assurance of state-of-the-art and future-proof document solutions with the highest standards of compatibility, consistency and reliability. This is ensured by direct access to Adobe's proprietary software technology, with the support of a dedicated implementation team at the Océ R&D headquarters.

Broadly-based PDF implementation

Océ's commitment to a broadly-based implementation of PDF technology is already reflected in a number of significant product developments. For example, new printer generations such as the latest Océ TDS-series of multifunctional wide-format systems incorporate on-board Adobe PDF support in the printer controller, which greatly enhances printing speed and reliability. Meeting the need for convenient conversion of documents from hard-copy to digital form, Océ scanners in the Océ TDS series have a direct scan-to-PDF capability. This allows scanned documents to be sent directly to the archive or to any other destination on the network, as PDF files.

During this process, tasks like scanning, format conversion, compression and generation of file information are all handled in a single, automated process. This is performed transparently and requires no special operator skills. Ensuring that all document information is preserved, the Océ Image Logic® technology for real-time image processing provides the highest possible scan quality every time, with a range of selectable copy modes to match the quality of the original document. Full PDF support is also incorporated in Océ's latest Océ Engineering Exec® archiving and document management software, making PDF an integral part of the engineering document process, ensuring you that the full document fidelity of PDF is consistently represented for all your document archival and management needs.

Advice and support for optimum implementation

Like any part of the engineering process, successful PDF implementation is not achieved simply by purchasing hardware and software. It requires a careful analysis of users' needs and working processes, resulting in individual recommendations for a cost-effective implementation that will deliver optimum results. Océ document consultants possess extensive knowledge and expertise on the engineering document process. This enables them to advise and support enterprises in implementing PDF-based document flows and gaining the full benefits that these offer.



For Adobe information,
visit www.adobe.com

Océ-Technologies B.V.

Venlo, the Netherlands

Page 6 of 6



**Printing for
Professionals**

For Océ information
and services, visit us
at www.oce.com

© 2002 Océ-Technologies B.V. Illustrations and specifications do not necessarily apply to products and services offered in each local market.
Technical specifications are subject to change without prior notice. All trademarks are the property of their respective owners.