The calibrate
Prepress Coach

Radix Preflight

Automated proofing and correction

RADIX
Print 4.0 made easy

Contents

As a service provider, calibrate Workflow-Consulting GmbH implements the automated process for the production of printed and electronic media worldwide. Radix is calibrate's modular product package consisting of services and software. The focus is on the automation of processes. Here, the focus is on security in the reconciliation of production data with the metadata for production. The goal is digitisation - Print 4.0 made easy.

The calibrate Prepress Coach consists of five parts. In Part 3, „Radix Preflight - Automated proofing and correction," we will show what needs to be taken into account for automated verification and for any necessary corrections that may be necessary.

Management Summary

The printing industry has adopted the term „preflight check," which is common in the aerospace industry. The „preflight check" involves checking the technical condition of the aircraft before flight operations and the take-off check before each flight. Like a pilot, the prepress specialist uses defined standards to check the production data before printing. While the unmanned aircraft is still a long way off in scheduled flight, the printing industry is embracing automation as part of Print 4.0. Here, the scope of application goes far beyond the matching of data with standards. The Radix Preflight Engine is able to carry out automated corrections to files and thus, so to speak, enables the unmanned start of production.

There are several national and international efforts that focus on colour management. The International Color Consortium (ICC) is a consortium for the standardisation of colour management systems for all operating systems and software packages. The founding members of the ICC in 1993 were industry giants such as Adobe, Agfa, Apple, Eastman Kodak, Microsoft and others. While Microsoft has left the ICC, new members have joined. These include Heidelberger Druckmaschinen AG, Hewlett-Packard, Konica Minolta and Kyocera.

The European Color Initiative (ECI) is a group of experts concerned with the media-neutral processing of colour data in digital publishing systems. It was founded in Hamburg in June 1996 from the initiative of the publishing houses Bauer, Burda, Gruner+Jahr and Springer. Due to the creation of free high-quality IC profiles of common printing conditions, working with ICC profiles has changed considerably for the better. One of the best-known colour profiles is ISO coated v2, which has established itself as the standard both for preparing print data for offset printing on coated paper and for digital printing.

The Fogra Research Institute for Media Technologies e.V. is a non-profit association in Munich. Its aim is to promote printing and media technology in the areas of research, development, and application and to make the results available to the printing industry. The institute is an honorary member of the ICC and has succeeded in establishing a number of standards. Fogra plays a key role in shaping the ISO standards used in the printing industry - first and foremost ISO 12647, which describes colouring standards, paper standards and process control methods for all basic printing processes.

We need standards and norms as reference values for reviewing and correcting PDF files. PDF/X is an important ISO standard for PDF-based print data. The concern of PDFX-ready, the Swiss association of leading publishing experts, is secure and efficient data exchange. PDFX-ready and the Ghent Workgroup (GWG) are working towards industry standards based on the PDF/X ISO standard.

Once the PDFs have been checked and corrected, they are assembled according to rules that make further processing possible. A number of important criteria must be taken into account for rule-based print sheet generation in digital, sheetfed and web printing, saddle stitching or perfect binding alike. Automated proofing, correction and assembly are ultimately the foundations for the success of a strategy towards autonomous workflows.

Fig. 1: The Radix Preflight Engine can do more than what the pilot does before take-off; while it follows standards and norms during testing, it can do a „fix" on top of everything else.

Introduction

The multiple use of data, especially its use in different media, requires that the content is available in a form that can be processed in the same way for the different channels. Media-neutral data leads to the concept of single source publishing. The goal of using media-neutral data is: to use content that is available in a single source multiple times with as little effort as possible and to bring it to the customer in different combinations via a wide variety of channels.

The media landscape has been in a phase of upheaval for years, characterised above all by concentration, strategic realignment, organisational restructuring, and optimisation of business processes. Closely linked to the concentration processes in the media industry is the convergence of media channels, telecommunications, and information technology, caused by the digital transformation.

Radix Preflight uses two approaches to control corrections and checks. On the one hand, special corrections and checks can be called up in a targeted manner, with parameters such as resolution, number of pages or dimension being transferred dynamically for each call. On the other hand, **Radix Preflight** processes a job ticket in which the expectations of the print product are defined as so-called „intents". The job ticket retrieval thus enables the separation of the WHAT (the sender's product requirement) from the HOW (the business logic integrated in **Radix Preflight** to check and correct print data according to the specifications).

What is important during colour conversion?

Colour management is constantly active in the current systems. Even if the user does not adjust any settings or even deactivates them, predefined basic settings are used. The result of this unexpected colour conversion may not be satisfactory.

To produce print data correctly, the printing conditions must first be known. These are decisive for the separation of images. If the printing conditions are not known when the data is created, it is advisable to create media-neutral print data. In practice, if there is no information about the printing process and the substrate, the data is prepared for offset printing on coated paper.

The **Radix Preflight Engine** is able to prepare colours or convert them according to the planned printing condition. Here the software takes into account whether the output system can handle RGB images or not. One challenge is to bring images of different sources with various ICC profiles to a common denominator, taking into account colour range groups (Fogra 39, ISO coated v2, ISO coated v2 300). An additional challenge is the conversion of spot colours. This is done by optimising the conversion of the converted spot colours with as little ink as possible. Alternatively, the spot colour conversion can be done in the output system or at the Digital Front End (DFE), provided these are configured accordingly.

It must first be stated that colour management cannot be the proverbial umbrella with which everything can be lumped together. While ICC-based colour management, which works with source and destination profiles and separates colours with a defined black structure, works very well for image material, the conversion from RGB to CMYK delivers „unexpected" results for vector data and texts. By using special methods for the conversion, it is possible to ensure that black and grey vectors as well as texts are printed only in the black channel - in contrast to an image, where a black area remains built up in four colours, regardless of whether the element was previously defined in RGB, grey or already in CMYK. This also applies to the pure primary and secondary colours.

The target for colour conversions is still CMYK offset printing according to Fogra 39 and Fogra 51 for coated materials – and Fogra 52 - for uncoated materials.

Fig. 2: Colour management remains one of the most important issues on the path to the desired result. While ICC-based colour management works very well for images, converting from RGB to CMYK for vector data and text gives „unexpected" results.

Even in inkjet digital printing, which can often reproduce a larger colour range, or in high-speed inkjet printing, which comes close to printing on uncoated material due to the printing speed, print data is usually delivered prepared according to the offset standard. Conversion of the print data for these printing processes can be carried out either centrally, with an appropriate workflow tool, or at the digital front end.

There are so-called „wide-gamut" printers on the market. Wide-gamut printers have a very large reproducible colour range, which is achieved by using additional printing inks such as orange, green and violet. To make the most of the colour range, it is recommended to use an exchange colour range (e.g., eciCMYK v2 or PRMG-MR) or a multi-channel print profile. The **Radix preflight engine** can either leave the images in RGB, convert them to a large 4C exchange colour range, or convert them directly to the printer's n-channel colour range. Exceptions can be defined for the vectors and the fonts. These can either remain in CMYK or the spot colour or are also converted to the n-channel colour range of the printer.

In the job ticket that is passed to the **Radix Preflight Engine,** the target printing condition is defined as a so-called „Colour Intent". If desired, a 4/4-colour job can be automatically converted to CMYK, or the settings ensure that a 4/1-colour print product is created completely.

Of course, RGB variants can be generated for online publications and the viewer is provided with binding preview images, with the exception of certain spot colours. In addition to the exception of spot colours, the **Radix Preflight Engine** is also capable of „mapping" specific RGB or CMYK colours, i.e., displaying the elements of the different colour models.

Fig. 3: Choosing the right colour range is a task for prepress professionals. In a fully automated process, this task is performed by the Radix Preflight Engine.

How is proofing and correction carried out?

Standards and norms thus form reference values for reviewing and correcting PDF files. PDF/X is an important ISO standard for PDF-based print data. It can be used to achieve accurate transmission of data. Among other things, the ISO standard PDF/X forms the basis for checking and correction by the **Radix Preflight Engine**.

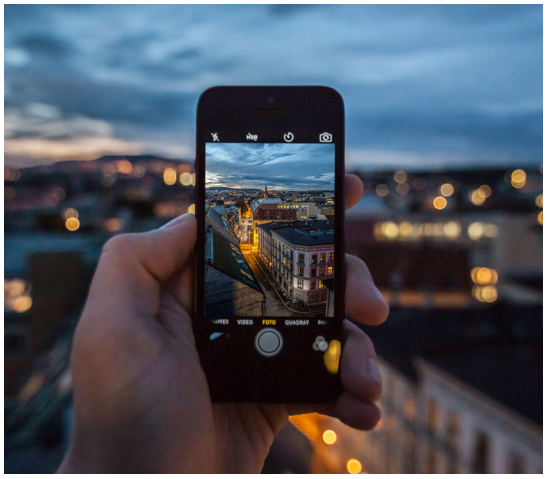

Fig. 4: Today, a good picture is quickly taken with a cell phone - but whether the resolution is sufficient for a poster remains to be seen.

Because by definition a standard is a recognised, yet only a unified and mostly applied way of describing something, the **Radix Preflight Engine** also covers the proofing and correction of individual requirements. If the PDF meets the individual requirement, it is also „good". The system automatically recognises that the file was not saved as PDF/X, however the basic PDF/X rules were applied for its creation.

A decisive advantage is offered through the passing on of proofing and correction rules or proofing and correction rule groups - similar to the concept when working with paragraph styles, which build on each other. The rules are the basis for the conversion by means of necessary corrections leading to a standard. The conversion can basically be done in two levels – Level 1 does not include visual changes, while Level 2 performs visual changes, e.g., RGB to CMYK.

In addition to colours, there are numerous other parameters that must be taken into account, including page size with bleed specifications or non-proportional scaling. The correction of page sizes to a defined final format (based on the layout intent defined in the ticket) is used in practice if the PDF files were created, for example, in Microsoft Word or Adobe Photoshop. These programs only know one format and therefore do not support the concept of final format and bleed.

Another routine is the addition or detection of blank pages. This option can be used to fill in the perimeter of calendars or the contents section of bound products (vacant pages). Further rules can be defined for multi-coloured small font sizes or even thin lines. It is possible to „recolour" both, and lines can be strengthened. Likewise, „overprint white" or „knock out" bright objects can be set. Automatic correction can embed missing fonts if necessary.

The next challenge in terms of proofing and correction is image resolution. Here, the **Radix Preflight Engine** enables Down-/Up sampling and Unsharp Masking. Up sampling is the method of enhancing an image by increasing the image resolution. In image processing, unsharp masking refers to a filtering method in which the appearance of sharpness of a photo is increased by using an unsharp copy of that photo.

If a customer works with technical drawings (computer-aided design, or CAD) and exports PDF files from this background, thousands of small vector elements can be created. These extremely „complex" pages cause correspondingly long computing times. Under certain circumstances, even the assembly of the individual pages is no longer possible due to the computing times, or at the very least, the workflow is slowed down. The **Radix Preflight Engine** is able to convert parts of complex pages into images and thus significantly increases the effectiveness and cost-effectiveness of the method.

In the field of digital and label printing, non-printing elements are increasingly used in PDFs. These are usually page elements defined in specific spot colours that are not required for printing but for post-processing. These include cutting contours, embossing stamps or varnishing. The PDF data format allows the definition of so-called processing steps (ISO 19593) to identify such non-printing elements in the PDF. The **Radix Preflight Engine** supports the recognition of non-printing elements in order to define them as Processing Steps in the PDF. Depending on the type of post-processing, these elements are subject to different inspection criteria than the rest of the PDF. For example, a cutting contour may only be present as a vector path, which in turn must be closed.

For large format printing, recognising, and harmonising the scaling factor is an important step. Was the PDF created 1:10, 1:100 or 1:5? Once the scaling factor has been determined, it is taken into account when checking the image resolution and the dimensions of lines and texts.

Test reports

A test report must contain the test result for individual test samples. What and how it is tested depends upon the requirements. These requirements may be described in the common standards or standard sections but may also be described in other technical specifications. Only the findings of the examination obtained by testing the individual test samples are recorded in the test report.

In addition to many details, there are four main test criteria which are crucial for the subsequent steps in the workflow: The format, the volume, the colourfulness and whether the PDF can be processed at all. For the fully automated workflow, the **Radix Preflight Engine** is capable of generating a machine-readable report.

Human-readable reports are also possible and offer users a high level of security-especially as a customised report layout meets user requirements. For example, a traffic light can make escalation levels instantly visible. All necessary information stored in the file is thus easy for the user to recognise.

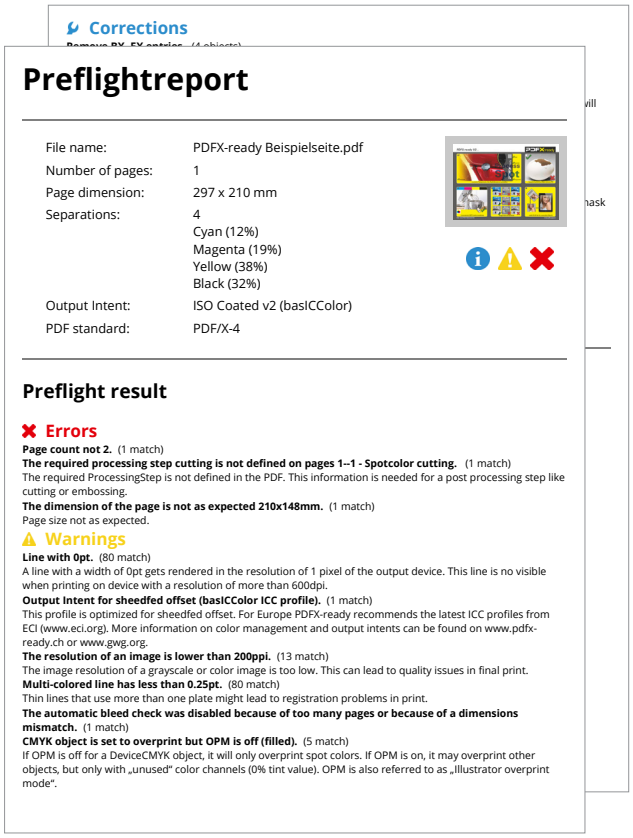

Fig. 5: The results of a test are readable by machines and humans.

Benefit

The advantage of **Radix Preflight** for the user is obvious: data checking is always based on a job ticket, so incoming data checking is standardised and independent of personnel. The system dynamically performs product-specific checks and corrections, harmonising the print data for further processing in the workflow.

Whether the inspection reports are to be read by a human or a computer is irrelevant to the **Radix Preflight Engine.** The form is merely a different way of outputting the most important parameters for monitoring and ensuring stable workflows.

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