

Printers' Guide

Basics of print data preparation I

Nowadays, the printing companies receive their print data from various sources. The traditional procedure in a printing house whereby the data are prepared in a uniform workflow and transferred to the printing machine direct ceased to be the only one long ago. Many self-employed media designers and advertising agencies can send their data to different printing houses. This is done nearly exclusively digitally, as, e.g., direct via web or server solutions.

By means of preflights, automatic / manual corrections or by clarifying specific questions with the customer, the printing houses can offer a certain degree of certainty in the event of data being incorrect. Everybody who is involved in print data preparation should, however, know a few basics and potential sources of faults. Many parameters like the color profile, the PDF version or the corresponding job settings in the software may result in faults without that being noticed.

The basis of all image data that shall be printed and/or processed is the color space or, to be more precise, the embedded color profile. In prepress, many print data are in the RGB color space and must, in one way or another, be converted into the CMYK color space later-on. In order to standardize that, ICC profiles are used.

But what is an ICC profile?

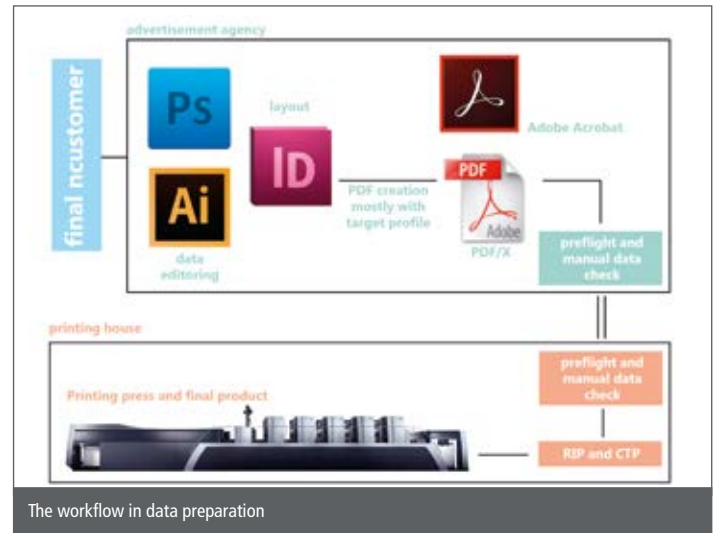
For every ICC profile, the so-called characterization data are used, e.g., the FOGRA 51 published by FOGRA in Germany for 4-color offset printing on coated paper. These data comprise all characteristics or, to be more accurate, the output properties for specific output conditions, in this case offset printing with process inks on coated paper. These characterization data can then be used in order to generate different print profiles.

Diverse standard profiles can be downloaded from the "Downloads" section of the website of the ECI European Color Initiative (www.eci.org).

The following are just some examples for offset printing:

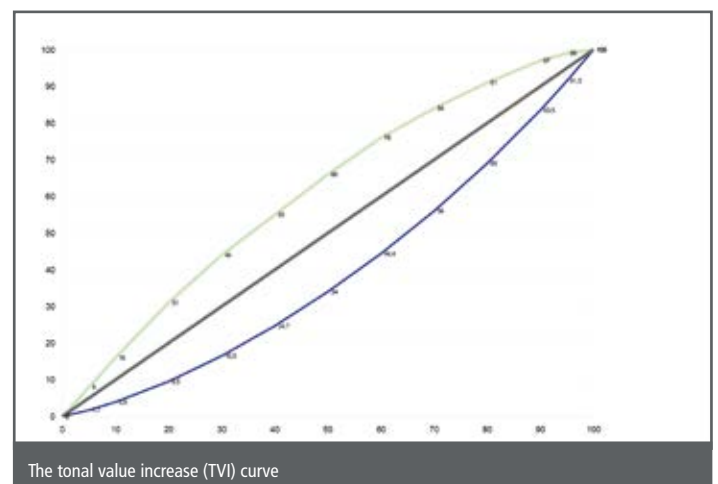
Name	Output on	Characterization data
ISOcoated_v2.icc	offset printing coated paper (old standard)	FOGRA 39
PSOcoated_v3.icc	offset printing coated paper (old standard)	FOGRA 51
ISOuncoated_v2.icc	offset printing uncoated paper (old standard)	FOGRA 47
PSOuncoated_v3.icc	offset printing uncoated paper (new standard)	FOGRA 51
WAN-IFRANewspaper26v5.icc	web offset news print paper	IFRA 26
eciCMYK.icc	universal exchange format	FOGRA 53
PSOcoated	offset printing coated paper	FOGRA 43
NPScreenISO12647.icc	non-periodic screen	

With the aid of these profiles, the user can optimally adjust the print data to the specific printing condition. He/she must be aware that the printed images will inevitably look different to those on the monitor depending on the output criterion. This cannot be prevented and must be communicated accordingly to the end customer.



And what exactly is changed?

- The color space is converted into CMYK. As a result, the color scope of all reproducible colors is different (CMYK is smaller than RGB). The user and/or the end customer must know and understand that.
- Maximum ink application is adjusted accordingly. The theoretically possible maximum ink application of 400 % cannot be used without causing any difficulties, as, e.g., ink set-off. Therefore, ink application is, for instance, reduced to 300–340 % in offset printing and, not least for cost reasons, to even 220 % in newspaper printing. Here as well, substantial differences, e.g., as to the contrast in the image depths, may occur.
- The tonal value increases in the printing machine standardized in ISO 12647-2 are automatically embedded into the ICC profile and then offset in the RIP later-on. If these data are not available and/or the wrong profile is selected, there will be problems in the tonal value increase in printing.
- The type of black generation in the image is selected through the color profile automatically. There are different ways to expand the theoretical subtractive color mixing (CMY) in printing through the color black.



black separation with maximum GCR



cyan



magenta



yellow



black



black separation without GCR



original picture CMYK

Black generation

With Under Color Removal (UCR), the chromatic colors (CMY) are reduced in the image depths, and black is added instead. As a result, the contrast is slightly increased and maximum ink application is reduced.

With Grey Component Replacement (GCR), the achromatic components of an image (equal portions of CMY generate grey) are replaced with black. With maximum GCR, maximum ink application can be reduced extremely, which thus saves ink and costs respectively. In addition, the image loses much contrast. This is above all done in the newsprint profiles. In sheetfed offset, in most cases a medium GCR is set.

→ The Rendering Intent, i.e., the ink conversion mode from one color space to the next, is set. With the perceptual rendering intent, all colors outside and within the target color space are proportionally adjusted. With the colorimetric rendering intent, only the colors outside the target color space are moved to its edge. These settings may, e.g., result in substantial changes of colors which can be reproduced in RGB but cannot be printed. The color impression, too, and/or the different color effects of two colors outside and inside the target color space may be different depending on the rendering intent.

These are just a few important changes which occur as a result of the conversion by means of an ICC profile. Due to the different technical basic principles of images on the monitor (RGB, additive color mixing) and the printed image (CMYK, subtractive color mixing), color and image differences occur inevitably. The user can, however, adjust his/her data optimally and consistently to the specific output condition by means of the ICC profile that is best suited for him/her.

Since some printing companies work with specifically prepared ICC profiles and due to the lack of knowledge on the part of the end customers and/or due to the fact that prepress staff is sometimes unskilled, another approach now prevails above all in large online printing companies. A standardized ICC profile, mostly ISOcoated_v2.icc, is taken as given, and then the printing company converts it into the correct target profile in its own workflow. In this case, however, losses of color may occur due to the multiple conversion. Here as well it can be seen that many users feel familiar with the widely used ISOcoated_v2.icc and have difficulties in accepting other and/or new color profiles like the PSOcoated_v3.

In order to ensure a certain degree of quality, the print data producer should, therefore, not only rely on mechanisms from third parties, but rather pay attention to the above-mentioned topics himself.

Now that some problems arising in connection with the use of color profiles have been explained, possible faults in PDF preparations will be dealt with in more details in the next edition of the Printers' Guide.

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