SLOVENSKI STANDARD
SIST ISO 16760:2020

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Grafična tehnologija - Izmenjava podatkov v grafični pripravi - Priprava in vizualizacija RGB-upodobitev za uporabo v grafičnih delovnih procesih na osnovi RGB

Graphic technology - Prepress data exchange - Preparation and visualization of RGB images to be used in RGB-based graphics arts workflows

Technologie graphique - Échange de données pré-impression - Préparation et visualisation d'images RGB à utiliser dans les flux de travail des arts graphiques basés sur le RGB

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Graphic technology — Prepress data exchange — Preparation and visualization of RGB images to be used in RGB-based graphics arts workflows

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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 130, *Graphic technology*.

Introduction

This International Standard provides guidelines for image preparation and print simulation in a graphic arts print workflow using RGB images (RGB workflow).

Digital still camera (DSC) images have now largely replaced film in the prepress stage of graphic arts printing and most images printed originate from digital cameras. Standard document exchange using PDF/X-4 and PDF/X-5 formats supports the use of RGB content and provides a ‘late binding’ printing solution where colour conversion is performed only when the document is printed. In this way, all of the original image data can be retained and the conversion for print can be optimised based on the original image content, key image attributes, and the available press colour gamut. These standard document formats provide an ideal framework for RGB workflow.

The current best practice for image preparation is to view and adjust images on display. When RGB images are adjusted, proofing mode is selected for a reference printing condition and a calibrated monitor is used. In this way, users can see an accurate preview of the printed result. This workflow is shown in Figure 1.

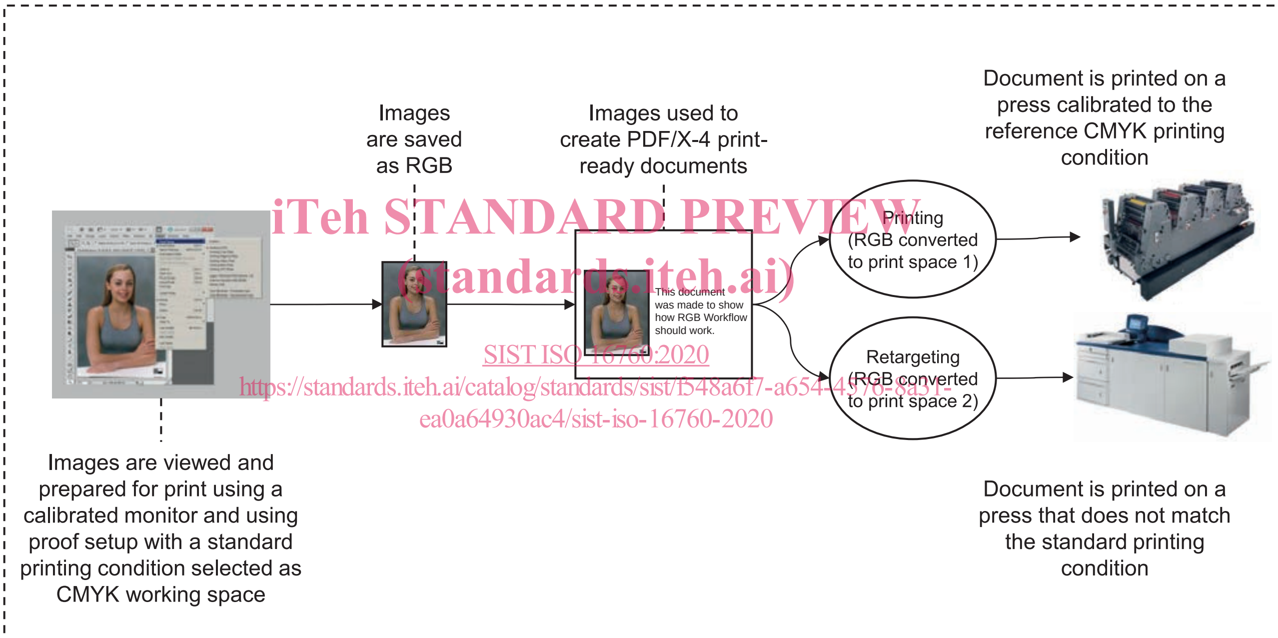

Figure 1 — Current best practice RGB workflow

There are a number of limitations in this workflow:

— Although it is possible to set up a calibrated monitor and viewing environment defined by Adobe RGB (1998) Colour Image Encoding or ISO/IEC 61966-2-1, it is not usually the case that all stakeholders have a calibrated monitor and the same viewing conditions. In the proposed RGB workflow, an RGB Reference Print can be shared easily among stakeholders.

— For inexperienced users, critical colour judgement on screen is harder than on print and so the resulting colour might not be what the user desires. The proposed RGB workflow is described for both experts and inexperienced users.

— The intended printing condition needs to be communicated to every stakeholder by independent means and all users need to know how to set up a viewing environment appropriate to the printing condition. In the proposed RGB workflow, the intended printing condition is included as metadata with the image.

— The approval status of an image is not clearly shown. In the proposed RGB workflow, the approval status is included as metadata with the image.

The proposed RGB workflow addresses these limitations as shown in Figure 2. In this RGB workflow, candidate images are printed on an RGB Reference Printer that has been calibrated to produce an accurate simulation of the intended printing condition. These printed images are checked in a controlled print viewing environment and, if necessary, further adjustments are made until the intended print result is achieved. When RGB image files are created and checked in this way, metadata that describes the intended printing condition and the image approval status is added.

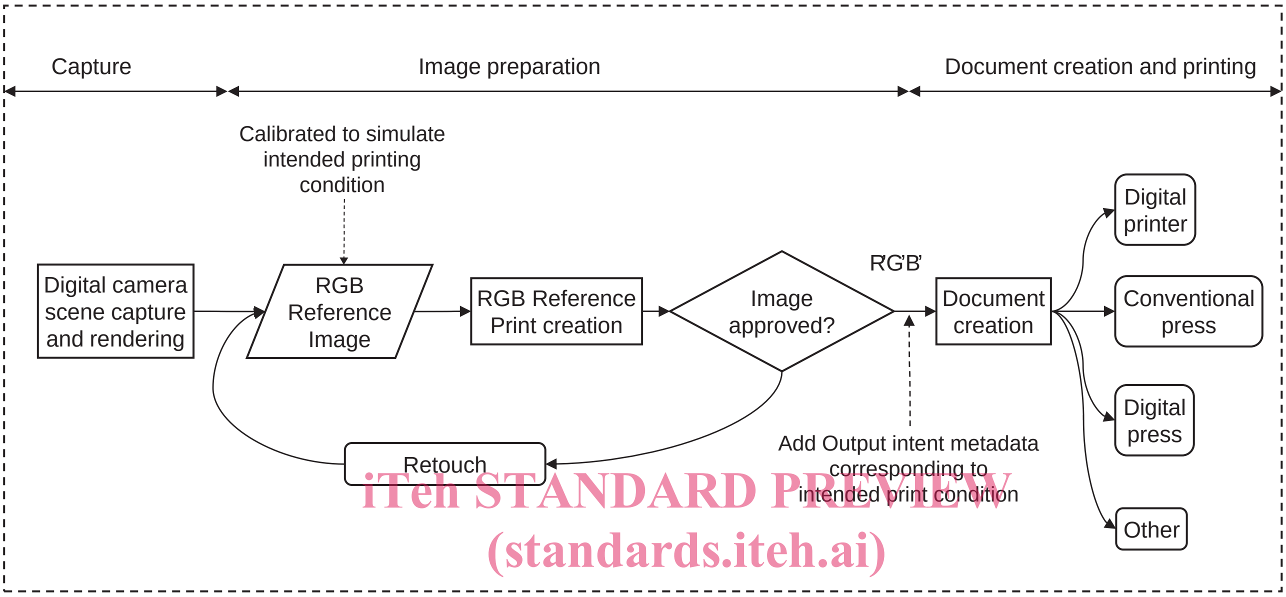

Figure 2 — RGB workflow from scene to printing via RGB image data

Careful preparation of RGB images holds the key to a successful RGB workflow. There are a number of aspects to consider when preparing images for print, including the identification of image highlight and shadow points and the careful mapping of important image colours into the colour gamut of the printing press. Since most printing processes have a significantly different colour gamut size and shape from the set of colours represented in an image, care needs to be taken when editing images so that important colours are retained. This is done most effectively by associating the RGB image with a CMYK press profile. This International Standard describes how to prepare these RGB images. Figure 2 shows the RGB workflow described by this International Standard and R'G'B' is the prepared RGB image.

NOTE For the proposed workflow, although a calibrated soft proof viewing environment is not required, the calibration of a reference printer is required and this print needs to be viewed in a standard calibrated viewing environment. If possible, printers with automatic calibration need to be used in cases where users are not familiar with the calibration process.

When this workflow is adopted, images can be prepared and incorporated in documents which can be printed on multiple printing systems producing prints with a similar appearance.

When the RGB image data are approved based on a hardcopy print, consistent judgement can be made.

This workflow is supported by the PDF/X-4 and PDF/X-5 standard document formats. Documents are expected to be approved using ISO 12647-8 (validation print) or ISO 12647-7 (contract proof).

It is envisaged that printing systems will be developed to produce prints that conform to this International Standard. It can be the case that systems that already conform to the requirements of ISO 12647-8 or ISO 12647-7 will be extended to produce RGB Reference Prints. Such systems will provide an easy means for users to ensure that images and the documents that include these images are printed reliably.

This workflow relates to images that are destined for four-colour commercial printing. Photographers need to be aware that alternative file versions of an image can still be required for specialized printing conditions.

Annex D provides further details of key RGB workflow concepts.

Graphic technology — Prepress data exchange — Preparation and visualization of RGB images to be used in RGB-based graphics arts workflows

1 Scope

This International Standard specifies requirements for an RGB workflow for graphic arts printing based on the use of reflection prints (RGB Reference Prints) as the evaluation vehicle for coloured images. It provides guidelines on the creation of print-targeted RGB images (RGB Reference Images) and simulation prints.

This International Standard requires the identification of a pair of ICC profiles for each image: an image profile and a profile describing the reference printing system. These profiles provide individual colour transformations for gamut mapping and colour separation. This International Standard does not provide any guidance as to how these gamut mapping or colour separation transforms can be specified.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3664:2009, *Graphic technology and photography — Viewing conditions*

ISO 11664-4 (CIE S 014-4/E:2007), *Colorimetry — Part 4: CIE 1976 L*a*b* Colour space*

ISO 12234-1, *Electronic still-picture imaging — Removable memory — Part 1: Basic removable-memory model*

ISO 13655, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

ISO 15076-1:2010, *Image technology colour management — Architecture, profile format and data structure — Part 1: Based on ICC.1:2010*

ISO 15790, *Graphic technology and photography — Certified reference materials for reflection and transmission metrology — Documentation and procedures for use, including determination of combined standard uncertainty*

ISO 18619[1)], *Image technology colour management — Black point compensation*

ISO 19445[2)], *Graphic technology — Metadata for graphic arts workflow — XMP metadata for image and document proofing*

ISO/IEC 10918-1, *Information technology — Digital compression and coding of continuous-tone still images: Requirements and guidelines — Part 1*

ISO/CIE 11664-6 (CIE S 014-6/E:2013), *Colorimetry — Part 6: CIEDE2000 Colour-difference formula*

TIFF, Revision 6.0 Final, Adobe Systems Incorporated, June 3, 1992

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

1) Under preparation.

2) Under preparation.

3.1
RGB colour space
three-component colour encoding defined by a linear transform from CIE XYZ

Note 1 to entry: Such a transform can be specified as a 3 × 3 matrix, and the transform between XYZ and additive RGB is then performed by multiplying by this matrix or its inverse.

Note 2 to entry: Adobe RGB (1998) is an example of an RGB colour space.

3.2
characterized printing condition
printing condition for which process control aims are defined and for which the relationship between input data (printing-tone values, usually CMYK) and the colorimetry of the printed image is documented

Note 1 to entry: The relationship between input data (printing tone values) and the colorimetry of the printed image is commonly referred to as characterization.

Note 2 to entry: It is generally preferred that the process control aims of the printing condition and the associated characterization data be made publicly available via the accredited standards process or industry trade associations.

3.3
colour gamut
solid in a colour space, consisting of all those colours that are: present in a specific scene, artwork, photograph, photomechanical, or other reproduction; or capable of being created using a particular output device and/or medium

[SOURCE: ISO 22028-1:2004, 3.8]

3.4
colour rendering
mapping of image data representing the colour space coordinates of the elements of a scene to output-referred image data representing the colour space coordinates of the elements of a reproduction

Note 1 to entry: Colour rendering generally consists of one or more of the following: compensating for differences in the input and output viewing conditions, tone scale and colour gamut mapping to map the scene colours onto the dynamic range and colour gamut of the reproduction, and applying preference adjustments.

Note 2 to entry: In the terminology defined in ISO 22028-1, some of the transforms described in this International Standard would be better described as colour re-rendering, however, this International Standard does not differentiate between colour rendering and colour re-rendering transforms and uses the term ‘colour rendering’ for both.

[SOURCE: ISO 22028-1:2004, 3.11]

3.5
highlight point
luminance level or image area corresponding to a reference white in the principal subject area of a scene

Note 1 to entry: Lightness of the objects in the scene are viewed in relation to this reference white. This can be a white “object” such as a piece of paper, a shirt, etc. or some such object which does not even appear in the scene but with which a comparison is made by reference to one’s memory of such objects.

Note 2 to entry: Image areas brighter than this point are called highlights. These include specular highlights, diffuse highlights that are more highly illuminated than the principal area and fluorescent colours.

Note 3 to entry: This wording is based on Bartleson and Breneman[22] and Giorgianni and Madden[23].

3.6
output intent
metadata used to communicate the intended printing condition, usually by means of an ICC Profile

3.7
prepress
first stage of the graphic technology workflow, prior to printing, that includes all the operations necessary for the preparation of images and image carriers

3.8
RGB Reference Image
RGB image prepared according to this specification which can provide a reliable reference to printed appearance for evaluation by stakeholders

3.9
RGB Reference Print
print of an RGB Reference Image that has been prepared in conformance with this International Standard

3.10
RGB Reference Printer
printing system that is capable of producing RGB Reference Prints

Note 1 to entry: RGB Reference Printers do not use RGB inks but typically use CMYK inks, converting from RGB to CMYK before printing.

3.11
shadow point
luminance level or image area corresponding to a maximum dark point and/or area of a scene that should be reproduced as a dark end of grey gradient on a print or a display

4 RGB workflow overview

4.1 General

RGB images are represented in an RGB colour space such as sRGB or Adobe RGB (1998) and as part of the prepress processing need to be converted to CMYK or similar colour space for printing. It is now standard industry practice to convert to a characterized printing condition, for example, CGA/TS 21-CRPC6, Fogra39, or JapanColor using ICC colour conversion.

NOTE The reference printing conditions that are provided as examples here are for offset lithography; however, the principles of this International Standard apply to all standardised printing conditions.

This Clause describes how to make RGB Reference Images (4.2) and how to make simulation prints (RGB Reference Prints) based on the characterized printing condition (4.3).

4.2 RGB Reference Images

4.2.1 Configuration of RGB workflow

Figure 3 shows image-processing workflow using RGB Reference Images. A process to convert RGB images to RGB Reference Images shall be supported and a process to convert RGB Reference Images to simulation print should be supported.

