Making sense of printing standards:

A glossary of printing terms

- By Kevin O'Connor

RGB: an acronym for Red, Green and Blue. Human eyes, camera and scanner sensors plus computer displays use red, green and blue in different combinations to sense or display all visible color.

CMYK: This acronym stands for Cyan, Magenta, Yellow and Black. Printing presses uses these four inks to print full color images. Much of the challenge of printing color correctly is caused when original RGB color is converted to CMYK. Going from RGB to CMYK reduces the color gamut. Some presses add extra inks, such as orange, green and violet.

XCMYK: This acronym refers to a printing technique which delivers an expanded gamut, using CMYK inks only. Printing to the GRACoL specification with CMYK delivers approximately 60% of the Pantone library; using XCMYK delivers approximately 84%. XCMYK can be used with both offset presses and digital devices.

Characterization: Characterization is the process of measuring and recording the color behavior of a particular device, such as a camera, a scanner, display, proofing device, or press. The process of characterization delivers color profiles. It can be summed up in one sentence: we ask the device to deliver color, and we measure the differences between what we asked for and what we received. It is also called color profiling. This is distinct from calibrating.

Calibration: The process of returning a device to a known, predictable behavior so that its behavior is consistent and predictable. Once a device is calibrated, it can be profiled.

Color Profiles: A color profile is a snapshot of the behavior of a device's color behavior at a moment in time. If something about the device is changed, such as the paper, or a setting, the snapshot is no longer current. Contemporary applications such as Adobe Photoshop, Illustrator and InDesign use color profiles to help designers create and deliver the best color possible. These are sometimes called ICC color profiles.

Color Working Spaces: While they are often descriptions of color behavior of specific devices, some are theoretical models. Examples include sRGB (Standard RGB), which is a near-universal default for many digital cameras and displays, and AdobeRGB:1998, a working space bigger than sRGB created by Adobe for print workflows.

Apple has been moving its devices away from sRGB standardization to the **P3 color working space**, which is also larger than sRGB. This color space is derived from DCI-P3 Digital Cinema , a color working space standard for digital projectors. Video edited on a Mac using P3 will match what a digital projector shows when both ends of the workflow are properly color-managed.

ICC: The International Color Consortium defines the standard for how color profiles are created, what information is recorded in them and how their formats are to be.

iccMAX: This is a new standard for color management workflows, which extends the amount and types of information that can be stored in color profiles, such as CxF format data, described below. It was created to address limitations in previous workflows that didn't deliver enough color information for certain uses. It is currently in development, with a goal of being released in 2018 as ISO 20677.

Standard: A standard defines the goals for a desired outcome, and is produced by a standards body, such as the ISO. An example of an ISO standard is ISO 12647-2: 2013; Graphic technology — Process control for the production of half-tone color separations, proof and production prints — Part 2: Offset lithographic processes. People often use only the first phrase in conversation, such as ISO 12647-2:2013. The number after the colon is the year; it's possible to have earlier versions of some standards (such as ISO 12647-2: 2004), so indicating the year to specify the version is important.

ISO: The International Organization for Standardization, headquartered in Geneva, Switzerland. Members are representatives from 163 countries' national standards bodies.

ANSI: The American National Standards Institute is the ISO member from the United States. It coordinates standards from groups such as CGATS.

CGATS: the Committee for Graphic Arts Technologies Standards, is the accredited body in the United States which develops standards for U.S. printing and publishing industries. CGATS develops standards which are published nationally by ANSI and taken to the ISO for consideration and promulgation worldwide.

Specification: A specification is a set of guidelines and data which help achieve the goals outlined in a standard. For example, in the United States, the SWOP specification and the GRACoL specification conform to the ISO 12647-2:2013 standard.

Methodology: A method or technique used to comply with a specification. You use a method to match a specification in order to comply with a standard.

Web offset printing: Offset printing refers to a method of printing which transfers (offsets) an image of a page to be printed from a plate to a rubber blanket, which then transfers the image to the final surface to be printed. Web offset printing uses long rolls of paper which are printed then trimmed to size after printing, at very high speeds. By contrast, sheetfed offset printing uses the same printing technology to print pre-cut sheets of paper.

SWOP: an acronym for Specifications for Web Offset Publications. SWOP is the default destination in Photoshop for converting color from RGB to CMYK, though in many cases, it shouldn't be.

GRACoL: an acronym for a specification called General Requirements for Applications in Commercial Offset Lithography. Just as SWOP is the specification for web offset printing and gravure printing, GRACoL is the standard for offset sheet printing.

ISO 12647: this ISO standard defines goals and tolerances for a series of printing methods and processes. It has several parts, as shown below. Each part shows the date of the most recent version, using the same title "Graphic technology — Process control for the production of half-tone color separations, proof and production prints":

• ISO 12647-1:2013: Part 1: Parameters and measurement methods

• ISO 12647-2:2013: Part 2: Offset lithographic processes

• ISO 12647-3: 2013: Part 3: Coldset offset lithography on newsprint

• ISO 12647-4:2014: Part 4: Publication gravure printing

• ISO 12647-5:2015: Part 5: Screen printing

• ISO 12647-6:2012: Part 6: Flexographic printing

• ISO 12647-7: 2016 Part 7: Proofing using other devices than a press, using digital files.

ISO 12647-2: Section 2 of this standard deals with Offset lithography, a printing technique specified most often by designers when ordering print jobs. The current version is ISO 12647-2:2013.

G7 (CGATS TR015): G7 is a calibration methodology that delivers consistent gray appearance across a wide variety of printing output. Any device that offers digital output correction using curves in the output software can be managed using G7. The human eye detects color casts and flaws in printed areas which are supposed to be neutral more easily than matching exact shades of color. By making various printing processes deliver consistent color in which neutrals are neutral in appearance to the eye, an acceptable visual match can be achieved for matching output from different devices and processes.

TC130: Technical Committee 130 (Graphic Technology) is the ISO group responsible for developing standards for the graphic arts industry. The United States is a participating member of ISO TC 130. The ISO requires an ANSI-accredited U.S. Technical Advisory Group (TAG) for each ISO TC to which the U.S. wants to contribute. Those groups provide American technical experts to ISO committees.

Characterized Reference Print Conditions: Tests and measurements have been made for best quality output printing with various types of printing processes. These measurements have been saved to be used for reference. A print house can download these measurements, and use them to compare to measurements of their own presses. If there is a significant difference between the reference and the actual behavior, improvements can be made, so that the print house can match the quality of the reference as closely as possible.

A corollary method, **SCCA—Substrate Corrected Colorimetric Aims,** allows a print house to change papers on which to print, without having to make a new set of tests to assure best quality on each paper or other substrate. Using SCCA converts the reference data to customize

it for a particular paper, continuing to maintain the print quality for each substrate. This saves large amounts of time and expense while maintaining optimal quality.

sCGATS 21-2: (ISO/PAS 15339 Graphic technology – Printing from digital data across multiple technologies): This standard refers to a set of characterized reference print conditions. It is composed of 7 print characterization datasets. These sets have a shared visual appearance because all are based on G7 gray neutral appearance methodology, making them match more closely. Each includes a description for a typical paper used for each process, going from newsprint to premium coated papers. These data sets are:

• ISO15339-CRPC1; Typical ColdsetNews. This describes small gamut printing on newsprint, printed without ink being dried using heat.

• ISO15339-CRPC2; Typical HeatsetNews. This describes a slightly bigger range of color that can be printed on improved newsprint type paper, using a heated drying method.

• ISO15339-CRPC3; Typical PremUncoated. This describes printing on matte finish, uncoated types of paper.

• ISO15339-CRPC4; Typical SuperCalGeneral. This dataset describes printing on super-calendared paper. Calendaring is the paper-making process where uncoated paper is made very smooth, improving its visual appearance. Super calendared paper is the least expensive paper used for magazine publishing.

• SO15339-CRPC5; Typical PubCoated. This describes typical publication printing on coated papers.

• ISO15339-CRPC6; Typical PremCoated. This data set describes large gamut (typically commercial) printing. It is equivalent to GRACoL 2013, which, among other things, specifies the color of white of the paper used to develop the dataset, which can be used as a reference when using the SCCA software to convert the data set for a different paper.

• ISO15339-CRPC7; Typical Extra Large. This describes extra-large gamut printing processes which can deliver a greater range of printable color than the other processes described in the previous 6 sets.

SCTV: Spot Color Tone Value is a method for calculating uniform visual spacing of intermediate tones of a spot color ink. It is defined in ISO 20654:2017. It is calculated using color instrument measurements of the solid ink, substrate and one or more patches of intermediate tones to be measured. This can help ensure that color values that must match consistently, such as logo colors, are made consistent each time, regardless of printing processes.

PQX/PRX (ISO 20616): This is a standard in development that allows for the exchange of Print Requirements (PRX) information between print buyers and other persons in the print workflow, and the exchange of Print Quality (PQX) information about various aspects of print quality, including color management, process control, quality deviation and other needed info. It is not yet released.

CxF: The Color Exchange Format, version 3, is a tool for describing color characteristics and behavior in greater detail than previous formats allowed. It is defined in ISO 179721:2015.

CxF is designed to be a method of communicating color that is device-independent, unlike CMYK or RGB color values, which are both device-dependent. Device-dependent means that a color recipe, such as CMYK values for a particular color, will appear different on different output device and paper combinations.

CxF3: delivers better accuracy in describing color, and eases the exchange of color information between different industries and processes. It is mostly used behind the scenes, built into software, as opposed to being a format that designers would need to work with directly.

TR016: ANSI CGATS TR 016-2014 Graphic Technology - Printing Tolerance And Conformity Assessment specifies how to measure the deviation from matching the reference data in the sets discussed above, and suggests some ways to decide how much deviation is acceptable. Using this assessment approach helps maintain and guarantee the quality and consistency which are the goals of all this effort at standardization.

About
Rods and Cones

Rods and Cones, established in 1996, is a consulting company that serves the graphic and printing industries.

Our expertise includes color management, automation, process control, proofing set-up and maintenance, workflow analysis and implementation, and much more.

We are here should you have questions about your color control and other workflow issues. Please don't hesitate to call (831) 421 0131, or email info@rodsandcones.com.

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