What is color management?

Color management is based on measuring color
Color measurement is based on human vision
Color appearance is controlled by ICC profiles
Profiles make color "the same" (or as near as possible) on different devices
Main limitations are "color gamut" and repeatability
Secrets of success: consistent materials and workflows, controlled lighting, process control, etc.

Color management approaches

- Proprietary
  CGS ORIS, GMG, EFI, etc.
- Open
  ICC (International Color Consortium)
- Video / cinema
  3-D LUTS - like ICC DLPs (Device-Link-Profiles)
Color management is NOT...

- A perfect science
- A guarantee of perfection
- A substitute for quality control
- A cure for unpredictable devices
- A mind-reader

Why do we need color management?

- Match the appearance of an image, product or brand-color from concept to output

Why do we need color management?

- Accurate, consistent results, regardless of source or destination

Why do we need color management?

- Minimize the difference between printing systems

After color management

- Minimize the difference between printing systems... within their available "color gamut"

Light, color and vision
White light contains all colors

The eye only "sees" Red, Green, Blue

The eye only "sees" RGB

RGB are the "primary colors" of vision

RGB mixtures can produce any color

RGB lights are ADDITIVE
RGB lights are ADDITIVE
CMY inks are SUBTRACTIVE

CMY inks subtract R, G or B from white light

Cyan subtracts red from white light

Magenta subtracts green from white light

Yellow subtracts blue from white light

Magenta subtracts green from white light

Cyan subtracts red from white light

Measuring Color

Expressing what we see scientifically
Color measurement

- Measure an object, printed sample, color swatch, monitor – anything we can see
- Convert the visual experience into numbers
- Standard units (e.g. LAB) can be used to:
  - Build an ICC profile
  - Check color accuracy
  - Specify a desired color, independent of process

Colorimeters (inexpensive)

- 3 colored filters (approximating XYZ)
- Typical use – monitor profiling

Spectrophotometer

- About 32 spectral samples per reading
- More accurate and powerful (and expensive)
  - Typical uses: print calibration & characterization (profiling)

Spectro-densitometer

- Hand-held device reading density and LAB
- Typical uses: print calibration and process control

Measuring illumination standards

- Old: M0, M2
- New: M1 (D-50)
  - Shows the effect of fluorescent materials (e.g. OBAs)

It’s all based on human vision

- Color measurement would be impossible if we didn’t understand how we see color
Color vision experiments (1920s)

- Attenuators
- Monochromatic RGB wavelengths
- Reference wavelength (Stepped from 380 to 780 nm)

Visual matching functions

- Amount of RGB light needed to match each reference wavelength

Visual matching functions:
- \( \rho \), gamma, beta

Visual matching functions:
- Example reference wavelength

XYZ comes from rho, gamma, beta

- CIEXYZ
- CIELAB comes from CIEXYZ

- CIEXYZ
- CIELAB \( L^*a^*b^* \)

Just two of several CIE color spaces derived from the original research

L\(^*\)a\(^*\)b\(^*\) is a "3D color space"

- L\(^*\) (lightness axis)
a* (red – green axis)

b* (blue – yellow axis)

a*, b*? – just remember fruit

CIELCH – more intuitive

Where did LAB and LCH come from?

Angle of view affects color

- Original CIE tests analyzed central 2° of retina
## Angle of View Affects Color

- Later work used surrounding 10°
  - Slightly different results
- So there are two CIE "standard observers", 2° and 10°

## How "Standard" is Your Eye?

- We all see color slightly differently
- Color blindness is simply an extreme example
- All color workers should pass a color vision test

## Human Vision is Not a Constant

- Varies dynamically due to factors like ...
  - Mood
  - Memory
  - Personal preference
  - Adjacent colors
  - Ambient lighting

## Key Variable: Chromatic Adaptation

- The human visual system's ability to compensate for changes in illumination color
  - Similar to camera "auto white-balance"
Color "correction"

How color was managed before ICC

Printing relies on RGB/CMY opposites

First tri-color color printing (1893)
- RGB camera separations direct from the subject
- Printed with "red", "blue" and yellow ink (no black)
  (Original print has faded)

First tri-color color printing (1893)
- RGB camera separations direct from the subject
- Printed with "red", "blue" and yellow ink (no black)
  (probable scene restoration)

Traditional enlarger color separation

Separation negatives
- Cyan
- Magenta
- Yellow
- Black

Why add black to CMY?
- Simulating black with high CMY densities leads to dirty colors
- Controlling gray balance is easier with black ink
- Replacing CMY with black reduces ink costs
<table>
<thead>
<tr>
<th><strong>Slide film</strong></th>
<th><strong>Photographic paper</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Makes “black” with just 3 CMY dyes</td>
<td>Makes “black” with just 3 CMY dyes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Offset lithography</strong></th>
<th><strong>Offset lithography</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal CMY makes a muddy brown</td>
<td>Gray balance helps, but “black” is still gray</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Offset lithography</strong></th>
<th><strong>Ideal inks</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adding black ink makes shadows “rich black”</td>
<td></td>
</tr>
</tbody>
</table>
Real-world inks

Real-world vs. ideal inks

Original scene

Ink / filter impurities (no correction)

Ink / filter impurities

After ink compensation

Original scene

Camera RGB inverted to CMY

Printed with ink corrections
Correcting for ink errors

Printed from camera RGB films
Printed with ink corrections

Traditional ink correction methods

- Local darkening lightening of CMYK films or plates
  Dyes, acids, brushes, scrapers, years of skill
- Camera-back "masking"
  Low-contrast positive films registered over RGB negatives
- Electronic scanners
  Hardware-based "color computers" to automate the masking process

1968 Hell C296 drum scanner

Mechanical enlargement
Analog "color computer"
Volt meter
Really cool oscilloscope (basically useless)

Digital scanner (ICG 1984)

World's first color-accurate "soft proofing".
Changed scanner setup from obscure numbers to simple visual adjustments

Visual color management

1. Evaluate original
2. Scan
3. Print
4. Evaluate print
5. Repeat if needed

Scanner color management

- Adjust scanner controls to suit original and press
  Optimum settings determined by trial-and-error
- Custom closed-loop setups or 'links' for every pair of input and output devices
  Inefficient, skill-intensive, not very accurate
Device-dependent color management

There has to be a better way!

ICC (the better way)

- International Color Consortium
- Initiated by Apple in early 1990s
- First ‘open’ Color Management System (CMS)
  - Cross-platform (Mac / Windows / etc.)
- Defines standard color management rules

ICC color management

Main goals:
- Constant color appearance regardless of source or destination
- Automated “color matching”

Basic ICC principle

- Device-independent color
- Translating each device into a common ‘color space’ via its own ‘ICC Profile’
- Each profile is independent of all others
- So if one device changes, only its profile is affected
### Device-independent color

- Custom-made for each individual device
- Convert between device values & CIELAB

The Profile Connection Space (PCS)

<table>
<thead>
<tr>
<th>Input Profile</th>
<th>Display Profile</th>
<th>Output Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ICC benefits: efficiency and accuracy

- Device-dependent color

### Device-independent profiles

- Custom-made for each individual device
- Convert between device values & CIELAB

The Profile Connection Space (PCS)

### The Profile Connection Space (PCS)

- Input
- Display
- Output

### Conversion principle

- RGB pixels
- Different pixel values, same color
- CMYK pixels

- Camera profile
- Color Management Module (CMM)
- Press profile
The Device-Link-Profile (DLP)

- Expert-level option
- Faster processing
- Special CMYK rules
- Same result as joining two regular profiles

ICC profiling sequence

- Stabilize* the system
- Calibrate
- Characterize
- Create the profile

*IMPORTANT: Calibration and color management will seem to fail if the system is unstable

Custom monitor profiling

- Accurate color requires a CUSTOM ICC PROFILE
- Essential for EVERYONE who judges color
- Art director, photographer, designer, pre-press
- An un-profiled monitor is economic and creative suicide

Good, cheap display profiling

- basiCCColor display
  www.basiccolorusa.com
- ColorEyes Display
  www.integrated-color.com
- Spyder4 ELITE
  www.datacolor.com
- i1 Display Pro
  www.xrite.com
Ideal color-critical monitor features

- Good cross-screen uniformity
- Wide viewing angle
- ≥ 10-bit LUTs (better smoothness)
- High dynamic range (rich blacks)
- Wide color gamut (Adobe RGB)

Typical high-end monitor gamut

Monitor profiling frequency?

- Good LCD monitors are extremely stable, especially with LED back-lighting
- One profile can last its lifetime
- Little need to re-profile if settings don’t change
  - In fact re-profiling can introduce variations!
- But check hardware settings regularly!

Input Profiling

Camera, scanner

Scanner profiling

Camera profiling (should you?)

- Essential for fine-art reproduction
- Advisable for products & catalogs
- Pretty pointless for sport, editorial, portraits 
  - Because a custom camera profile is often negated by lighting, camera settings, etc.
- Even the best camera profile can seem to fail
Best input profiling software

Camera profile variables
- Different targets: different results
  It's really a "Target Profile", not a "Camera Profile"

Camera profile limitations
- Affected by light source differences
- Affected by camera settings
  etc.

Fine art & product photography

Avoiding reflections

Camera profiling details
Free at
www.hutchcolor.com
Camera re-profiling frequency?

- For general photography, one profile can last a lifetime
- Exception: for fine art, medical or product photography, capture the target at the beginning of each session and make a session-profile

Output Profiling

(Press, proofer, desktop printer, etc.)

Printer Profiling Essentials

- Software
- Measuring device

Printer profiling software

baslCColor print CoPrA i1Profiler
baslCColor.de ColorLogic.de X-Rite.com
... also Agfa, Heidelberg, Kodak, EFI, GMG, and others

IT8.7/4 characterization target

Visual layout Random layout

IT8.7/5 combination target

IT8.7/4 (n/nb/hh duplicates) P2P cols 4&5 TC1617

NEW!
**IT8.7/5 (a.k.a. TC1617) target**

- Vertical
- Horizontal

**Printer profiling**

**Printer profile software variables**

- Total ink coverage / Total area coverage
- Black start
- Maximum black
- Black shape (Black curve)
- GCR (Black width)

**Printer profile controls: X-Rite**

**Printer profile controls: basICColor**

**Determining optimum total ink**

- Total Area Coverage
  - Look for darkest patch
  - Show-through (thin stock)
  - Smudging
  - Non-drying
The importance of GCR

Gray Component Replacement

Benefits of GCR

- Ink cost saving (maybe)
- Easier to control neutral grays on press
- Better color gamut

Black ink adds COLOR!!

Because black = 100C + 100M + 100Y

Output (Printer) Profiles

- "Forward tag" (A2B)
  Converts CMYK to CIELAB from characterization target
  e.g. proofing source profile
- "Reverse tag" (B2A)
  Converts CIELAB to CMYK.
  Problem: many Lab values are unprintable!

Gamut Compression

Because black = 100C + 100M + 100Y

Red = 100% (180 – 80)
Red = 0% (100 – 80)
Gamut Compression

Out-of-gamut green

"Nearest" green

Gamut compression

Nearest color: same hue, lower chroma

"Nearest" green

Proiling frequency?

- Check printer accuracy as often as possible
  If it has drifted, try to restore the original conditions (media or hardware)
- Re calibrate as often as necessary
  If you can’t restore original condition, re-calibrate to G7 and the profile should continue to work well
- Re-proile as seldom as possible
  Beware: re-proiling can cause unexpected changes

Calibration vs. Profiling

Calibration defined

- Bringing a device (printer, monitor, camera, etc.) to a known, predictable state
- Calibration should make the device produce the same printed appearance as when it was last calibrated

ICC profiling sequence

- Stabilize* the system
- Calibrate (this is where G7 happens)
- Characterize
- Create the profile

*NOTE: Calibration and color management will seem to fail if the system is unstable
Traditional printer calibration

- Based on individual CMYK TVI curves (Tone Value Increase) a.k.a. dot gain
- Problem: same TVI curves produce different gray balance and tonality on different devices, inks, substrates, etc.

The G7 difference

- Simple calibration method for ANY printing system
- Produces similar gray balance and tonality regardless of inks, substrate, etc.

Core G7 concept

- Gray balance and tonality can be controlled by curves alone
- By defining those curves in appearance terms, G7 produces "shared neutral appearance" on all printing systems

Shared Neutral Appearance

- Digital
- Ink Jet
- Offset

Why is gray special?

- It’s the one color we can say is “right” or “wrong”, simply by looking at it
- Grays appear correct if they match the viewing “white point” (e.g. paper)

Which one is gray? – (easy)
Which one is gray? – (harder)

Which one is gray? – (very hard)

The power of gray balance

Original photo

Curves only

How G7 enhances ICC profiling

- A main goal of color management is to control grays
- G7 does this without ICC profiles
- G7 produces “pleasing color” without profiles
- Add ICC profiles for maximum color accuracy
  Note: G7 does not replace ICC color management but it often makes it better or more efficient

The GRACoL project (2004-6)

- Goal: define good commercial printing "appearance" as a standard ICC profile

Standardized printing

Avoiding custom press profiling
GRACoL research – take 1

- Follow ISO 12647-2 exactly
- Tests on two offset presses and three laminate proofing systems

ISO 12647-2 print standard (1994-2013)

- Defines...
  - Ink color
  - Paper color and lightness
  - TVI* curves

ISO result: unacceptable variation

GRACoL research – take 2

- Replace ISO TVI curves with P2P method (now G7)

G7 result: much closer match

GRACoL & SWOP (2006)

- Standard definitions of "print appearance"
- GRACoL = commercial offset
- SWOP = publication offset
- Common targets to aim for in...
  - Creative, Proofing, Pressroom
- Both look similar thanks to G7
Seven new ISO 15339 CRPCs

- CRPC 1 cold-set news
- CRPC 2 heat-set news
- CRPC 3 quality uncoated
- CRPC 4 super-calendared
- CRPC 5 pub coated (SWOP 2013)
- CRPC 6 commercial coated (GRACoL 2013)
- CRPC 7 generic large-gamut

ISO 15339 common hue angles

ISO 15339 (with paper color)

ISO 15339 relative (white-adapted)

GRACoL 2013 vs. GRACoL 2006

- Slight change in paper color
  - Aligns with new OBA-brightened papers
    (Invisible except in Absolute rendering intent)
- Slight change in solids
  - Smaller than typical press variation
    Insignificant for most users
- Bottom line: almost no difference
  - OK to use either one unless customers are very critical

GRACoL 2006 vs. GRACoL 2013
When is a Proof not a Proof?
- Desktop ink-jet printer
- GRACoL-certified proofer

Testing proof system accuracy
- Proof new IT8.7/5 target with full color management
- Evaluate in Curve4 VERIFY or equivalent software

Individual proof check
- Measure ISO 12647-7 Strip* on every proof

Verification software (examples)
- CHROMiX / HutchColor
- Spot On Press
- Alwan PRINT Verifier
- Bodoni Systems

*Free at www.idalliance.org
**Quality Control**

**Measuring error (Delta-E)**
- Difference between achieved and desired color

**Delta E ($\Delta E_{76}$)**
- Derived from CIELAB: $\sqrt{(\Delta L^2 + \Delta a^2 + \Delta b^2)}$  

Distance between two points in 3D Lab space

**Minimum visible Delta E**
- $\Delta E_{5.0}$ = theoretical limit of perception

**Typical tolerances – pictorial**
- $\Delta E < 2.0$ = typical proof
- $\Delta E < 3.0$ = good offset press
  (Average of all patches in the IT8.7/4)
Problems with Delta E76

- Not "perceptually uniform"
- A proof might fail when it’s visually acceptable
  Especially if the error is in chroma (saturation)

Delta E 2000 (ΔE00)

- Different equation in different color regions
- More visually uniform
- Better correlation to human vision
- Less sensitive to chroma errors

Delta E 2000 (ΔE00)

- Closer match to human visual preferences
- Less sensitive to chroma errors

Suggested tolerances

- G7 Master Pass/Fail document
  www.idealalliance.org

Viewing Color

- Standard viewing
  D50
  (ISO 3664:2009)
  The only correct way to view color
**D50 vs. 5000°K**

- D-50 (Daylight)
- 5000°K (blue-filtered tungsten)

---

**Metamerism failure**

- Meat section
- D50
- Office

---

**D50 vs. office light vs. tungsten**

- Office tube
- Tungsten
- D-50

---

**Avoid cheap "5000K" lamps**

- Courtesy GTI

---

**Quick Photoshop soft proofing**

- CMYK files are displayed semi-accurately in RGB
- Automatically, but not very accurately
- RGB files can be pre-viewed as CMYK with View – Proof Colors (Mac: Command Y)
- Not very accurate but good enough for most work
Accurate Photoshop soft proofing

- View > Proof Setup > Custom
- Simulate Ink Black = Relative proofing
  
  Maximum screen brightness but accurate contrast
- Simulate Paper White = Absolute proofing
  
  Shows paper brightness and color as well as ink limits

Dimmable booth benefits

- Saves hard-copy proofing costs
- Provides a visual reference for white balance and exposure
- Simplifies color-matching of non-standard proofs, pre-prints, original artwork, product samples, etc.

No viewing booth?

- Without a visual reference, how do you judge exposure or color balance?
- Simple: make the monitor the white reference
Donz white border trick

DonzRGBactions
www.hutchcolor.com - Free
- Create a white border inside the image
- Enlarges canvas to 125%

Undo border after viewing

- Reduces canvas to 80%
  (Back to original size)

White border trick benefits

- Provides a neutral reference when judging white balance by eye
- Provides a maximum-white reference when judging exposure by eye
- Simulates paper color of soft-proof

RGB workflow

How ICC device profiles control color
Typical prepress workflow

- Requires EVERYONE in the creative/production chain to use the same proofing, viewing & printing specifications (CRPC)
- Most important tips?
  - Photoshop color settings
  - Custom-profiled monitor

Possible color conversions

Photoshop™ Color Settings

- GRACoL or SWOP profile (2006 or 2013)
- Free at www.idealliance.org

Getting color right

Photoshop™ Color Settings

- GRACoL or SWOP profile (2006 or 2013)
- Free at www.idealliance.org

NEVER use the Custom CMYK tool!!!

Custom CMYK tool

- Not true GCR -179 x less accurate than ICC profiles!!
- 9 patches
- 1617 patches
- \[ \frac{1617}{9} = 179 \]
Choosing an RGB Working Space

- Should be equal to or larger than BOTH...
- The OUTPUT device (press) AND...
- The INPUT device (e.g. camera)

sRGB IEC61996-2.1

Offset press
sRGB

Adobe RGB (1998)

Adobe RGB Offset press

Digital SLR RGB (typical)

DSLR or slide film
Adobe RGB

ProPhoto RGB

DSLR
ProPhotoRGB

ProPhoto RGB Danger Zone

Illegal RGB values (no CIE meaning)
Biggest CIE-Legal RGB Space

BestRGB free at www.hutchcolor.com

But don’t use it unless you REALLY know what you’re doing.

Example of RGB Clipping

Edited in BestRGB
Edited in Adobe RGB

Example of RGB Clipping

Smooth reds in BestRGB
Plugged reds in Adobe RGB

Example of RGB Clipping

Green channel BestRGB
Green channel Adobe RGB

Converting vs. assigning

The most asked question in color management

Assigning a profile

- Changes image appearance but not pixel values (RGB or CMYK)
- Defines how the image will look when converted
Assigning a profile

- Changes image appearance but not pixel values (RGB or CMYK)
- Defines how the image will look when converted

Assigning a profile

- Changes image appearance but not pixel values (RGB or CMYK)
- Defines how the image will look when converted

Converting to a profile

- Maintains image color by changing pixel values
- Prepares the file for a new device

How do you "Apply" a profile?

- You don’t
- It’s a meaningless statement
- It takes two profiles to do anything

Rendering intents:

- Perceptual
- Saturation
- Absolute colorimetric
- Relative colorimetric

Adobe modification: "Black point compensation"
### Perceptual intent
- "Pleasing color" when going from large to small color space
- Uses profile's built-in "gamut compression"
- Accuracy (or pleasingness) depends on profile software

### Saturation intent
- Preserves maximum saturation at cost of hue accuracy
- Originally intended for simple line-work items
- Seldom used because color can be unpredictable

### Absolute Colorimetric intent
- Matches all colors as accurately as possible
- Used in proofing to simulate paper color
  - Proofing paper must be equal to or brighter than simulation space and have equal or greater color gamut
- Out-of-gamut colors may clip or plug without warning

### Relative Colorimetric intent
- Same as Absolute except all colors are shifted to match the input and output profiles' white points
- Used in proofing when proof paper is same color as simulation profile
- Also used to preserve original image contrast, but only if output space has equal or greater color gamut and contrast (black point)

### Relative with Black Point Compensation
- Adobe function (provided openly in late 1990’s)
- Modifies Relative intent to match both profiles' black points as well as white points
- Recommended default for RGB conversion, except with extremely saturated originals
**Safe, powerful image editing**

- Stay in RGB - send in RGB
- Soft-proof in CMYK (for print)
- Keep edits in ADJUSTMENT LAYERS
- Only judge color on a profiled monitor
- Always EMBED the PROFILE when saving
- Always ACCEPT the embedded profile when opening

**Efficient, fast RGB editing sequence**

- White and black
  Levels
- Brightness
  Gamma (in Levels) or Curves
- Gray balance
  Levels or Curves
- Global color
  Hue / Saturation

---

**CIELCH – the intuitive color space**

The power of LCH

- INDEPENDENT values of
  - Lightness
  - Chroma
  - Hue angle

---

**Normal Lightness**

**Lighter Lightness**
### Lightness Variations
- Notice Hue and Chroma don’t change

<table>
<thead>
<tr>
<th>Lighter</th>
<th>Normal</th>
<th>Darker</th>
</tr>
</thead>
</table>

### Chroma (Saturation) Variations
- Notice Hue and Lightness don’t change

<table>
<thead>
<tr>
<th>Lower</th>
<th>Normal</th>
<th>Higher</th>
</tr>
</thead>
</table>
Normal Hue Angle

Higher Hue Angle

Lower Hue Angle

Hue Variations
- Notice Chroma and Lightness don’t change

Lower°  Normal  Higher°

Exporting / Sending RGB Color

What export color space?

- Sending RGB files for print
  Convert to Adobe RGB (1998) or just embed the file’s native color space
  But make sure the printer can spell ICC!
- Sending to web
  Convert everything (RGB or CMYK) to sRGB
Specifying Pantone® colors

- NEVER use swatchbook CMYK values
  - Not based on standard printing
- Specify the color name
- Or supply a chip
  - Printer measures in LAB and creates optimum CMYK for their process

Simulating spot colors

- In Photoshop, assign the printer profile (e.g. GRACoL) to an image
- Select your desired color in Color Picker
- Photoshop displays best CMYK values
- (But affected by profile’s GCR amount)

Picking a color

Out-of gamut example

Gamut warning

In Gamut Example

Gamut OK
## XCMYK – Pushing the GRACoL Envelope

### XCMYK
- Announced Thursday, December 1, 2016
- New 4-color offset printing method, color space and profile developed by Idealliance
- Much larger color space than GRACoL
- No extra plates or inks required
- Compatible with 7-color (CMYK+OGV) printing

### XCMYK - why do we need it?
- Extending offset gamut with extra inks (e.g., CMYK+OG or RGB) is expensive, complicated and poorly supported by Adobe software
- Traditionally, printers often increase C, M, Y or K densities to match a product or customer needs
- XCMYK simply standardizes the concept

### XCMYK principle
- More ink = more color
  (Within reason)

### XCMYK method
- Print CMYK inks to high densities on good paper
- Use FM (or concentric) screening to enhance pastels
- Calibrate to G7

### Reference GRACoL proof
XCMYK

Typical enhancement

Typical enhancement

Getting started in XCMYK

- Go to www.idealiiance.org
- Register (even if not a member)
- Download free documentation
- Download free data set
- Download free ICC profile
- Let us know what you think

Getting Color Right

- Requires EVERYONE in the creative/production chain to use the same proofing, viewing & printing specifications (CRPC)
- Most important tips:
  - Standardized Photoshop color settings
  - Honoring the embedded profiles
  - Custom-profiled monitor

Secrets of successful color management
Secrets of success - production

- Stabilize the system
- Calibrate before profiling
- Test accuracy as often as possible
- If things change, try to eliminate the cause
- Re-calibrate as often as necessary
- Re-profile as seldom as possible

Secrets of success - creative

- Custom-profiled monitors
- Photoshop color settings
- Honor the embedded profile
- Edit photos in RGB, not CMYK
- Accurate hard-copy proofs
- Standard D50 viewing conditions

Comparing proof to press sheet

- Laying over each other sets unrealistic expectations

Comparing proof to press sheet

- View proof and press-sheet apart to simulate real-world viewing

When things go wrong

- Check RIP / DFE settings
- Check media and ink
- Check device calibration
- Check client’s file
  Wrong profile? Rendering intent?
- Check the proof or reference print
  Was it made to a standard?
- If all else fails - pick up the phone

Reality Check

You can’t always get what you want
Good news, bad news

- ICC color management is nothing short of magic
  But nothing’s perfect ....

Reality check

- ALL printing systems vary to some extent
- A proof is a “simulation” of a perfect press
- Every press run is slightly different
- Evaluating “quality” is not an exact science
- Quality is proportional to price
- Color is subjective – quality can be personal

Managing expectations

- Color management is not a perfect science
- Treat it with respect and it will serve you well
- Expect perfection and you may be disappointed
- Be grateful for “near perfection

What have you learned?

Learning more

Q & A

don@hutchcolor.com