Print Production – From Design to Print for Packaging

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About the Presenters

- Birgit Plautz
  - Manager of Technical Services – GMG Americas
  - 20 years experience in the industry
  - 8th Color Management Conference

- Eric Dalton
  - Director of Sales, West Region – GMG Americas
  - 17 years experience in the industry
  - 14th Color Management Conference
In the upcoming 60 minutes you will ...

- get to know color management and different PrePress workflows in packaging
- see how you benefit from a good color communication
- learn about the challenges of color management in package printing
Printing Basics
Printing Basics
Packaging
Traditional package printing methods

- Rotogravure
- Offset
- Flexography
Digital Printing in packaging

Electrophotography

Inkjet
One color?

Offset on coated cardboard
Offset on newspaper
Gravure on magazine paper

Different technologies and substrates!
Print buyer wants

- Best color match to his product
- Identical colors between brochures, advert in newspaper, packaging, etc.
- Same colors for a reprint
- Simulation of the printed product before the actual first print on press (proof)
In the area of packaging, color is one of the most important factors

Study: Johannes Gutenberg-Universität Mainz
http://www.uni-mainz.de/presse/22982.php

- Still a lot of processes are manual
- Open questions on how to manage color over the whole process
Color Management
What is color management?

- When we talk about Color Management:
  - Conversion (Custom profiles, Industry standard profiles like Gracol2013, etc.)
  - Standards (the standardized rule sets) – e.g. ISO 12647-2 for Offset
  - References & Print Characterization – (FOGRA 39L, custom characterization)
  - Proofing (Hard & Soft Proof)
Color Management = Black Box?

- Which color profiles do we / our customer / supplier use? (Proofprofiles, Separation Profiles, Normalization, ...)
- How do we receive the files from the customer / agency / etc.?
- What is the customer’s target?
- Steps from final artwork until platemaking?
  - Proofing
  - PDF Conversion
  - Dot gain compensation
- Just print it: What to consider on the press?
How do you receive your files?

1. Converted or tagged with the correct profile
2. Always or mostly converted to GRACoL
3. Not color managed
4. No Idea

German Office Pole Results

1. 18% Converted or tagged with profile
2. 29% Always or mostly converted to ISO Coated V2
3. 41% not color managed
4. 12% no idea
Color Management for what???

- RGB
  - Image:
    - R: 209, G: 105, B: 27
  - Camera:
    - R: 208, G: 103, B: 25
- CMYK
  - Printer:
    - C: 0, M: 68, Y: 99, K: 0
Color Management for what???
Conversion Profiles - ICC

The „classical“ conversion consists of two steps:
source color space to L*a*b*, L*a*b* to target color space

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<th>Source: digital camera</th>
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<td>L = 24</td>
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<td>K = 27</td>
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L*a*b*-color space as link between two profiles
the Profile Connection Space (PCS)
DeviceLink profiles

- Direct color conversion from source to target

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Direct link between RGB to RGB or to CMYK, as well as CMYK to CMYK color values. The L*a*b* values are only used for informative reasons.
CIELAB color space
The CIE-L*a*b* model

- Device independent color space

\[ L^* = \text{lightness}; 0 - 100 \]
\[ a^* = \text{Green – Red}; -a - +a \]
\[ b^* = \text{Blue – Yellow}; -b - +b \]

Thanks to a L*a*b*-coordinate a color could defined. Using the DeltaE calculation the distance between two colors could get described.
CIELAB color space
Color Distances

- DeltaE76 vs. DeltaE2000

\[ \Delta E_{ab}^* = \sqrt{(L_2^* - L_1^*)^2 + (a_2^* - a_1^*)^2 + (b_2^* - b_1^*)^2} \]

\[ \Delta E_{00}^* = \sqrt{\left( \frac{\Delta L'}{k_L S_L} \right)^2 + \left( \frac{\Delta C'}{k_C S_C} \right)^2 + \left( \frac{\Delta H'}{k_H S_H} \right)^2 + R_T \frac{\Delta C'}{k_C S_C} \frac{\Delta H'}{k_H S_H}} \]
Print Production
Print Production

Customer / brandowner (bTasty)

Design agency

PrePress /Repro

Printshop

Platemaking  Press
Print Production

Customer / brandowner (bTasty)

Design agency

PrePress /Repro

Printshop

Platemaking

Press

Pictures, logos, text, ...

Final artwork
Print Production

Customer / brandowner (bTasty)

Design agency

PrePress / Repro

Printshop

Platemaking Press

Reproduction work

Color Proof
Not that easy!

- What's with:
  - Dot gain compensation
  - Conversion Profiles
  - Customer's target
  - Press corrections
  - Proof Profiles
Two ways to consider color in the packaging print production - Manual Way -

1. **Customer / Agency**

2. **PrePress**
   - GRACoL2013 or others

3. **Target Proof** (GRACoL2013)

4. **Proof** (Custom profile)

5. **Manual adjustment**

   - File with manual corrections
Two ways to consider color in the packaging print production
- Professional Way -

Customer / Agency → GRACoL2013 or others → PrePress → Normalization → File correct converted → Conversion (Automation) → Proof with correct profile
Deliver best color services

- Define customer needs in case of color and the need of color management

- Understand what is color management: Start with the camera end with the print production -> Knowledge based performance on the market

- Be strong in communicating color and gain advantages
Specialties in Packaging Printing

- Packaging printing is characterized by
  - High demands on quality
  - Fast seasonal changes
  - Different printing processes
  - Different material and substrates
  - Frequent usage of spot colors
Variety of Materials

- Paper and Carton
- Corrugated Board
- Metal
- Labels
- Foil
  - transparent, white, metallic
  - front or reverse
Usage of Spot Colors

- Limited usage of spot colors in conventional printing
  - CMYK + PANTONE 301 C
Usage of Spot Colors

- Spot color separation in packaging printing
  - CMY + P 469 C + P 301 C + P 248 C
Biggest Challenge

- No standardization in packaging printing
- Frequent usage of “Gracol2013 coated” profiled data
  - Works partly in Offset
  - Only a CMYK standard without any specifications for spot colors
Why is it a problem to use “Gracol2013” profiled data?

- Color space might be cropped
  - Flexo and gravure printing offer more saturated inks
- Process characteristics might get lost
  - Break in gradation of highlights in flexo printing
  - Cell wall flooding in gravure printing
  - Different TAC settings
- No trapping information inside
Comparison GRACoL2013 to Flexo CMYK OPP
Industry standard vs. custom standard

When to use an industry standard?

All defined parameters are within the ISO tolerances
- analyze the paper class, paper tint, printability, printing inks

Sample: Printing on a Premium Coated paper with Printing Condition 1

Defined paper tint (M1): 95 / 1 / -4 → Tolerance ±3 / ±2 / ±4
Industry standard vs. **custom standard**

**When to use a custom standard?**

Printing process is not part of an industry standard

- **4C - Offset / publication gravure:** substrates that differ completely in printing behavior and papertint (special paper)
- Printing process differs completely
e.g. Packaging in Flexo or Gravure printing with spot colors

**Example: Flexible packaging printed in gravure**

5 colors (Cyan replaced with Blue + additional color)
OPP foil
Industry standard vs. custom standard

• When is a custom standard needed?
  • Printing process is not part of an industry standard
    • 4C - Offset / publication gravure: substrates that differ completely in printing behavior and papertint (special paper)
    • Printing process differs completely e.g. Packaging in Flexo or Gravure printing with spot colors

• Sample
  • Flexible packaging printed in gravure
  • 5 colors (Cyan replaced with Blue + additional color)
  • OPP foil
What exactly is a print characterization?

- The representation of the entire print production process
- Therein all parameters and variations (with an ideal average)
- Reduced to the color result
Preparation of the Fingerprint

1. Testprint with linear plates
2. Definition of all printing parameters
3. Test form creation
4. Fingerprint + Evaluation of printing quality + Sheet selection
5. Measure the test charts
6. Evaluation and optimization of measurements
7. Finalization of characterization data
8. Documentation
Steps to create a custom standard – Flexo printing

1. step: Testprint with linear plates
   - Inking series with different anilox rolls
   - Define the TVI
   - Define the “First Printing Dot”
   - Determine technical limitation (thin lines, small fonts)

2. step: Fingerprint with compensated plates
   - Testform with test charts and pictures
   - All parameters should correspond to later production environment!
Testform elements
Fingerprint Testform
Measure and evaluate the fingerprint.
How to Evaluate your Color Space

- Smoothness
- Size
  - Coverage of typical spot color library
  - Comparison to industry standards (e.g. GRACoL)
Profiles to be created

- Separation profile to convert images into target color space
  - GRACoL2013

- Proof profile to produce color correct proofs
  - Custom Flexo Standard
Conversion

- Photoshop
- Illustrator
- ColorServer
- PDF Editors (Hybrid PACKZ)
Different gamuts

- Blue - sRGB
- Coloured - ISO coated v2
- Red Dots – Flexo CMYK OPP
Color conversion

sRGB

GRACoL2013
Proof: GRACoL2013

Flexo CMYK OPP Reverse
Softproof: Flexo CMYK OPP

GRACoL2013
Proof: Flexo CMYK OPP
Selecting your tools for separation

- Gradients in Flexo need special attention
Selecting your tools for separation

- Gradients in Flexo need special attention
  - Min dot
  - Highlight bump
Selecting your tools for separation

- Gradients in Flexo need special attention
  - Min dot
  - Highlight bump

- Tools available, like
  - Adobe Plugins
  - Profiling tools
Color Accuracy vs. Printability

- Example Pantone 7650 C

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Ingredients:
The content of this presentation is entirely developed, created and designed by myself and with some help from some others. If you read this here, I seem to be not interesting enough as a speaker to keep your attention for long. I'm sorry.
How can I simulate my Color with other inks?

RULES TO SEPARATE SPOT COLORS

- VARIANTS
- MANUAL REWORKING
- PRIORITIES OF COLORS
- MIN / MAX DOT
- SCREEN ANGLES EXCLUSION
Get ready for production

What has to be done?
Next steps...

- Raster Image Processor (RIP)
  - Screening
    - Screen Ruling
    - Angle
    - Screen Type
  - DGC (dot gain compensation)
- Platemaking
- Mounting
- Printing
Wherever a color goes
it stays that color