Extended Gamut Printing
Pantone Hexachrome®

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What is Hexachrome Printing?

- An evolution of an age old problem of communicating and matching color.
- An expanded color printing system typically referred to as high fidelity or hifi print process.
- In addition to traditional CMYK inks orange and green inks are added to increase color vibrancy.
- Standards based, not proprietary.
Who developed Hexachrome?

- Co-developed by Richard Herbert, president of Pantone, in 1995, as an alternative to running multiple spot colors.
- The Pantone company originally was a Manhattan print shop for cosmetic and automobile industries.
- Lawrence Herbert developed the PMS (Pantone Matching System) to help communicate press color to clients.
History of Pantone 101

- Created a swatch book of ink color library for customers to select colors
- Added 4/C process simulation library as a cost effective alternative to printing spot colors
- Hexachrome builds upon the same premise by offering cost effective alternative for high end print jobs in 6/C
Why Hexachrome?

- Most cost effective “HiFi” print process
- Able to hit 90% of PMS spot color library by increasing in printable color gamut from 4/C process by 200%
- Most notable improvement in warm tones, green-yellows, and green-blues in addition to smooth skin tones.
Benefits of Hexachrome for designers

- Pantone product; designers are familiar with Pantone color guides.
- Can use multiple PMS colors in a job without added expense of extra bump (spot) plates.
- Don’t have to settle for inferior process 4/C simulations, 6/C simulations provide an ideal match.
- Hexachrome Color Selector offers a broader choice of colors from original Pantone spot library.
Benefits of Hexachrome for Printers

- Pantone product.
- Easily convert RGB & CMYK and/or multiple spot color jobs to Hexachrome using standard ICC profiles.
- “Gang up” converted (color harmonized) jobs to maximize press time.
- Wash-up is not necessary between jobs, change the plates not the inks.
Pantone Product

- Ubiquitous in the industry
- Standard color system for communicating color expectations
- Easy transition from PMS process or solid libraries to Hexachome
- Used in CPC, brand, design, and corporate identity
Easily convert jobs to Hexachrome

- Several options for converting RGB and CMYK bitmap and vector objects and named color systems (PMS)
- Can be done in Adobe CS or QuarkXPress products or downstream at a RIP
- Color Sever software available to automate conversion of Postscript or PDF files in addition to bitmap files
Gang Up jobs

- Decrease turnaround time on jobs
- More efficient use of plates and inks
10 Jobs, 2/C per job

Traditional =
- 10 separate press runs, wash-ups
- 20 spot color inks, 20 plates required

Hexachrome =
- 1 press run in Hexachrome
- 6 color inks, 6 plates in Hexachrome

HUGE savings!
Minimize down time on press

- Reduce ink inventory
- Reduce Anilox inventory by standardizing on rolls that offer the highest screening at target print densities
- Maximize press run time by eliminating wash-up between job; use the same ink set
- Reduce make-ready waste
- Increase billable press time
Hexachrome Certified Inks

- Hexachrome CMYK is not the same as process CMYK
- Hexachrome CMYK inks are cleaner, brighter, and have more fluorescence.
Pantone Hexachrome relies upon color management

- The only way to convert jobs to Hexachrome is by using ICC profiles.
- ICC profiles are a standard format for conveying color characteristics.
- Enables a smooth transition from CMYK or RGB originals to CMYKOG with accuracy.
- PMS conversions are handled by substitution of Hex simulation build.
Hexachrome profiling products

- GretagMacbeth ProfileMaker v5
- Monaco Profiler v4
- Creo ProfileWizard v2.5
Making Hexachrome Separations using ICC profiles

- Pantone HexImage and HexVector for Adobe CS Photoshop and Illustrator
- GretagMacbeth Multi-Color plug-in for Adobe Photoshop CS
- GretagMacbeth iQue Color Server
- QuarkXPress v4 + higher
What file formats allow six color channels?

- DCS 2.0 is ideal for bitmaps objects
- EPS is ideal for vector objects
- PDF v1.4 can contain DCS 2.0 and EPS
Separations

Most Hexachrome color builds use four or less inks. The selection of which ink is used is based on the ICC profile.

Look at PMS guide book, colors are specified in three colors, not four or more!

Rarely will a separation have 100% Orange or 100% Green.

Image shouldn’t become more saturated. Relative Colorimetric is usually ideal.
Nitty-Gritty of Hexachrome

- Though you will make six color separations your color builds rarely use more than four colors.

- Creating a six color build results in loss of color saturation from complimentary colors. (i.e. Cyan and Orange, Magenta and Green)

- Color build will look “dirty” from complimentary colors canceling each other out.
Nitty-Gritty of Hexachrome

- The Hexachrome Green plate shares the same screen angle as Hexachrome Magenta.
- The Hexachrome Orange plate shares the same screen angle as Hexachrome Cyan.
- Works well with AM and FM (stochastic) screening
Hexachrome PMS color guides

- Printed using 175 lpi (2400dpi) Agfa CristalRaster stochastic screening.
- Development of new guides with Creo
- Run Sequence: K C G M Y O
Standards, what standards?

Ain’t no standard for Hexachrome. No GraCol or SWOP guidelines for Hexachrome.

Loose recommendations on dot gain, print contrast, or SID for different print stocks and processes. (i.e. flexography, lithography, fine art)
Recommendations

- Consult *FIRST* for optimization of dot gain and print contrast
- Recommended target density ranges are for 150 - 175 line screen using UV or water-based inks

<table>
<thead>
<tr>
<th>Ink Color</th>
<th>Solid Ink Density (Status T) Coated stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexachrome Cyan</td>
<td>1.50 - 1.60</td>
</tr>
<tr>
<td>Hexachrome Magenta</td>
<td>1.40 - 1.50</td>
</tr>
<tr>
<td>Hexachrome Yellow</td>
<td>1.05 - 1.15</td>
</tr>
<tr>
<td>Hexachrome Black</td>
<td>1.70 - 1.80</td>
</tr>
<tr>
<td>Hexachrome Orange</td>
<td>1.40 - 1.50</td>
</tr>
<tr>
<td>Hexachrome Green</td>
<td>1.35 - 1.45</td>
</tr>
</tbody>
</table>

Orange ink density is measured with the yellow filter. Green ink density is measured with the cyan filter.
Rollers and Ink Volume

- The finer screen the better but need to be within target densities.
- Ideally 800 - 1000 LPI Anilox rollers
- 1.3 - 2.0 BCM. Less than 1.3 BCM is tricky but possible
Proofing Hexachrome separations

- Proof on computer monitor?
- Proof on Analog (film) proofer
- Proof on Inkjet
- Dirty secret! Most Hexachrome color separations can be proofed on 4/C devices.
Proofing Hexachrome separations

Like usual, the RIP is the key element to proofing Hexachrome separations.

Do you need the proof to show trapping, moire interference, and PMS colors?

Most RIPs do not support proofing six color separations instead relying upon the Hexachrome file to be reconverted back to RGB for proofing.
Proofing Hexachrome separations

Most Analog (film) Pantone Hexachrome proofers are 4/C.

The 4/C proofers use “HiFi” sheets to increase the color gamut.

Roland HiFi Jet and HiFi Jet Pro are the only true six color Hexachrome certified inkjet proofer.
PANTONE Licensed Hexachrome Proofers

DuPont:
- DuPont Digital WaterProof/Chromalin AX4
- DuPont WaterProof/Cromalin CV

Polaroid (Latran Technologies)
- PolaProof (Prediction 1420)

FujiFilm
- ColorArt
- FinalProof

Kodak Polychrome Graphics
- Kodak Approval XP4
- Matchprint Negative Color Proofing with HiFi sheets
- Matchprint Digital Halftone Proof with HiFi sheets

Roland
- HiFi Jet Pro (FJ500)
- HiFi Jet (CJ400)
Not for the timid

- Must have exceptional process control at the press
- Able to hold 0.004 - 0.006 registration
- Commit adequate press time to optimizing process control, testing materials.
Steps to moving into Hexachrome

- Optimize press configuration.
  - Determine which Anilox line screen allows you to meet target densities with selected substrate.
  - Create dot gain (TVI) curves to compensate for dot gain based on FIRST recommendations.

- Print ICC profiling characterization charts to measure optimized color output.

- Separate in Adobe Photoshop, Illustrator, QuarkXPress, or at CTP/Film RIP.
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Presenter: Dan B. Reid

This presentation is available for download,
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