Advanced Color Management workflow for InkJet applications

Dietmar Fuchs <dfuchs@colorlogic.de>
Product Manager
ColorLogic GmbH
Challenges of Color Management and Color Conversion in Ink Jet printing

What factors make color management complex?

Where in the process will it be problematic?

What could a high quality color management workflow for inkjet look like?

How can spot colors be printed in high accuracy with process colors?

Considerations and solutions using the example of the Durst color management workflow

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INKSPLITTING

Splitting the logical channels (e.g. CMYK) to the real ink channels used from the printer (e.g. CcMmYK)

Lighter areas in images/graphics shall use the light inks and darker areas the dark inks

Good transition between light and dark inks is crucial for nice and smooth gradations

Requests: Ink savings, take color acceptance into account, avoid peppering effect,…

Often RIPs are missing controls for this or they are difficult to handle
LINEARIZING

Not linearized raw curves are often bumpy and have way to high dot gain

Adjustments of the curves are always needed to avoid the ICC profile having to do too much work

Often a channel wise ink limit is necessary

Calculated linearization curves should be smoothed to avoid over compensation

The entire color management should be in 16 bit
Colorimetric linearizing (ISO 20654 - SCTV) is much better suited for ink jets than density based methods.
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Big holes in the gamut due to density based linearization.
Colorimetric linearizing (ISO 20654 - SCTV) is much better suited for ink jets than density based methods.
• This view shows the possible color management steps for one input color space
• Multiple input color spaces will typically be merged after step 3
• Many components are optional and may only be necessary for very high requirements
• Some steps (e.g., 9, 10, 11) may be conducted in a different order
OVERVIEW: DURST WORKFLOW*

Calibration and profiling is done in a Wizard like user interface

Transition/Linearizing – Ink Limiting – Profiling – Reprofiling

Complexity is minimized with a straight forward user interface and logical steps

Transition and linearization can be done in one or two steps

The ColorLogic CMM combines all steps in one link table which improves speed and accuracy

*The Durst Workflow is available for label, textile and corrugated applications
OVERVIEW: DURST WORKFLOW

- From one test chart measurement multiple profiles can be generated.
- All calculations are based on spectral color data.
- Ink Consumption: use the most beneficial ink amount and separations settings without sacrificing spot color mapping.
- CMYK or CMYK-OVG: use low priced ink sets for a job as the base inks are usually less expensive than additional inks.
- Adjust the gray balance according to clients' taste.
- Manage the many possible profiles for a given workflow.

### Calculate Substrate Profiles

<table>
<thead>
<tr>
<th>Profile Name</th>
<th>Substrate Profile Template</th>
<th>CMYK Reseparation Template</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CMYKcm_HD)_Economy</td>
<td>Standard (substrate)</td>
<td>Economy</td>
</tr>
</tbody>
</table>

Use less inks to reach the minimum ink consumption. Use maximum black (K) instead of CMY inks.
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OVERVIEW: DURST WORKFLOW

- Reprofiling with Correction DeviceLink profiles
- Only a little color wedge needs to be printed to "record" the printer/paper deviations
- Allows matching reprints
- Provides more stability and simplifies process control
CONVERSION OF SPOT COLORS

Pantone Cool Grey 7
LAB 63/0/-1

Using (LAB)
Alternate Color Space

CMYK 40/31/30/14
deltaE00 2.8

Pantone Cool Grey 7
LAB 63/0/-1

Using CxF/X-4 or
spot color data base

Production optimized
spectral color modeling

CMYK 0/0/0/49
deltaE00 0.6

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"By using ColorLogic technology, all requirements could be resolved in a very flexible manner. Speed is important for us, but by combining all profiles in one color transformation loss in speed is a non-issue."

Hans Peter Schneeberger
CEO PrePress Digital

Dietmar Fuchs <dfuchs@colorlogic.de>