Color Process Control and Verification in Fiery proServer and Fiery XF

Wide Format Series

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Wanted!

- Multiple short runs
- Rush jobs
- Predictable output
- Matching print standards
- Satisfied customers
After this webinar, you will be able to...

• understand the concept and value of process control
• use process control to determine when to take corrective action
• select the correct tool to correct for printer drift
• understand when and why to utilize G7 curves
• provide a better match between multiple output devices

Let’s take a poll first...
Process Control

What is it and why do I need it?
A very dry explanation...

*Process control deals with architectures, mechanisms and algorithms for maintaining the output of a *specific process* within a *desired range*.*
Desired range....?

• Conforms to an industry specification
  – FOGRA 51 or FOGRA 52
  – ISO Coated or ISO Uncoated
  – SWOP or GRACoL

• Visual appearance
  – Overall
  – Gray Balance

• Spot color accuracy
COLOR process control

• Color accuracy
  – Density
  – Hue
  – Saturation

• Not covered here but important
  – Resolution
  – Clarity
  – Speed
What changed?

• Is your printer functioning correctly?
• Device drift
• New media
• New ink
Device drift

CMYK = 0/100/66/0
L*a*b* = 61/127/105
Device drift

CMYK = 0/100/66/0
L*a*b* = 61/127/105

CMYK = 1/84/95/2
0/100/66/0
0/97/90/8

L*a*b* = 61/127/105
Device drift

CMYK = 1/84/95/2
L*a*b* = 61/127/105

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Device drift

CMYK = 0/100/66/0
L*a*b* = 61/127/105

CMYK = 1/84/95/2
0/100/66/0
0/97/90/8

L*a*b* = 61/127/105
Detecting the problem
Your color toolkit

What do you have available?
The EFI solution

• EFI Color Verifier Option
  • Optional
  • (Included with many Fiery proServers)

• EFI Color Tools
  – Re-linearize
  – Optimize
  – Visual Curves
Fiery XF Color Tools

Basic Color Tools set

Color Profiler Option adds...
Color verification

Process monitoring by the numbers
Delta-E or $\Delta E$ or De
Delta-E or ΔE or De

Average Delta-E

Individual color or peak Delta-E
What we monitor....

<table>
<thead>
<tr>
<th>Results</th>
<th>Delta E</th>
<th>Delta H</th>
<th>Delta T</th>
<th>Delta Ch</th>
<th>Delta L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta E</td>
<td>Tolerance</td>
<td>Measured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average all patches</td>
<td>3.00</td>
<td>2.42</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum all patches</td>
<td>6.00</td>
<td>5.27</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delta H</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum CMYK patches</td>
<td>2.50</td>
<td>3.19</td>
<td>✗</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Gray patches</td>
<td>1.50</td>
<td>0.04</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delta T (tone value difference)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum CMYK patches</td>
<td>10.00</td>
<td>2.68</td>
<td>✓</td>
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<td></td>
</tr>
</tbody>
</table>

Industry standards or your own
Color Verifier

- Color data comparison tool
- Automatic or manual
- Verify to a standard
  - Dataset
  - ICC profile
  - Proof #1
  - Press sheet
Color Verifier

Job Data

Job List

Reference Data

Job Preview

Results
Color Verifier

- Preferences
  - Delta-E values
  - Reporting option
    - Off
    - Normative
    - Informative
Color Verifier

- System Manager setup
  - Select “Control strip 1”
  - Select optional “Control strip 2”
  - Select “Characterization Data”
  - Select Delta-E format
  - Select Target tolerances
The Dynamic Wedge™

Standard Wedge

Dynamic Wedge
- Process Colors
- Spot Colors
- Process and Spot Colors
The Dynamic Wedge™

[Image of a woman holding a bouquet of flowers with the Dynamic Wedge logo]

[Diagram of the Dynamic Wedge setup with various options and settings]

characterization data:
- Generated from reference profile

Delta E format:
- dE 2000

Target tolerances preset:
- ISO/DIS 12647-7:2016 Contract Proof "Spot Color"

Channel:
- Spot color delta E limits
  - Maximum all patches: 2.5

 EFI dynamic wedge options
- Measuring device settings:
  - EPSON SpectroProofer: 16 patches
  - Process colors and spot colors: In-gamut colors only

Control strip 2
- (DEAlliance ISO 12647-7 Control Wedge 2013 (Epson SpectroProofer).tif)
- Print with color management
- Use on nesting sheet instead of job sheet
The Dynamic Wedge™
It’s wrong!

Now what?
First...

Check the output device!
Re-linearization or optimization

• Re-linearize
  – Reset ink limits
  – Adjust primary curves
  – No support at present for VUTEk printers

• Re-optimize
  – Per-patch color adjustment
  – Hue, saturation or chroma
Re-linearization or optimization

It does exactly what it says....
Re-linearization or optimization

Limited “repair” of color issues....
Relinearization

- Right-click on Output Device and select “Re-linearize device”
- Launch from Color Tools
Relinearization

• Manually load .epl file if necessary
• Select Measurement device
• Print and measure
• Follow recommendations
  – Re-linearization
  – Re-Ink Limit and Relin
Re-linearization or optimization
Re-linearization or optimization
Color optimization

Fine tuning the transform
Color optimization

Fogra 51

57/43/-7 ≠ 59/43/-10
Color optimization

Fogra 51

\[57/43/-7 + -2/0/3 = 55/43/-4\]
Color optimization

How it’s done...
Color optimization

Basic Color Tools

Color Profiler Option
Target patch selection

• 1617 – Most common selection for proofing
• 928 – Most common selection for production printing
• 234 – Useful for production printing
  – Built in “smoothing”
Color Optimization

• Launch “Optimize Profile option from Color Tools
• Select Workflow you wish to optimize
Color Optimization

- Select measurement device
Color Optimization

• Select optimization chart to print and measure
Color Optimization

• Select optimization method
Color Optimization

• Select paper white settings
• Absolute colormetric is the default
• Click “Next”
Color Optimization

- Print and measure targets
- Delta-E values are displayed
- Click “Optimize”, re-print, re-measure
- When Acceptable Delta-E values are obtained, click “Finish”
Ideal values

- Average Delta-E < 1.0
- Peak Delta-E < 5.0
- Paper white Delta-E < 1.0
- Target in Gamut (%) >98 for proofing
- Target in Gamut (%) media dependent for production

<table>
<thead>
<tr>
<th>Step</th>
<th>Average dE</th>
<th>Peak dE</th>
<th>Paper white</th>
<th>Target in Gamut (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.14</td>
<td>4.86</td>
<td>0.45</td>
<td>99.57</td>
</tr>
<tr>
<td>2</td>
<td>0.79</td>
<td>3.23</td>
<td>0.37</td>
<td>99.57</td>
</tr>
<tr>
<td>3</td>
<td>0.70</td>
<td>3.04</td>
<td>0.51</td>
<td>99.57</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
G7 Curves and gray balance

• Why?
  – Many (most?) customers accept prints that are gray balanced but do not conform to a specification such as GRACoL or Fogra 51
  – Fast gray balance “recalibration”
  – Fast “close enough” match between media & machines
Integrating G7 into your workflows

Common gray scale appearance
Integrating G7 into your workflows

Conform to a Specification
(GRACoL/FOGRA 51)

ICC Profiles
G7 procedure

- Print P2P file through desired workflow with Color Management turned off
G7 procedure

- Measure P2P target and use any approved method to generate G7 values
Procedure (G7 or Visual)

- Export or transfer values to Visual correction module and save as .vcc curve
Procedure (G7 or Visual)

• Select correction curve on Media pane of Output device
Re-linearization (or G7)

• How often?
  – Device drift
  – New media
  – New ink
Re-linearization (or G7)

• How often?
  – Device drift
  – New media
  – New ink
Re-linearization (or G7)

• How often?
  – Device drift
  – New media
  – New ink

• It may not work!
Re-linearization (or G7)

• How often?
  – Device drift
  – New media
  – New ink

• It may not work!
  – New media ICC profile
  – New calibration set (.epl & .icc)
Optimization

• How often?
  – Monitor verification values
Optimization

• How often?
  – Monitor verification values
  – Visual change
Matching multiple output devices

Two methods...
Method one

- Optimize each printer to the same specification
  - Fogra
  - ISO
  - IDEAlliance
The problem...

Colorimetric

Visual
The problem....
The problem....
The problem....
The solution: method two

- Select printer with the smaller gamut
- Optimize that printer to the desired specification
Method two

• Start optimizer for the second (and third, etc.) printer
• Select the “Use optional additional characterization data” checkbox
Method two

• Locate your “Working” folder

• Locate your optimization job folder
Method two

- Locate the .3cc file that matches your selected optimization step
- Note the time stamp
- Select the matching .IT8 data file (the time stamp will be slightly earlier)
We learned...

- To perform process control start with process monitoring
- Use Fiery Color Verifier for accurate process monitoring
- Use Re-linearization for “coarse” correction
- Use Optimization for “fine” correction
- Take corrective action before you are out-of-control
- Use a G7 curve for quick gray balance control
- Aim one device to another for a better visual match
Session resources

• X-Rite’s Complete Guide to Color Management
• Don Hutcheson’s educational video on G7
• help.efi.com/fieryxf
• Recorded webinar sessions
  – Linearization in Fiery proServer and Fiery XF
  – Profiling and Optimization in Fiery proServer and Fiery XF
Recorded World of Fiery sessions

• Don’t forget the existing Wide Format sessions - view here
Additional World of Fiery sessions

- March 8 - Color Process Control and Verification in Fiery proServer and Fiery XF
- May 3 - Is your RIP working hard enough?
- September 13 - Getting your Gray Balance in check with G7
- EFI webinar calendar
- Have your say on the next sessions
Color Process Control and Verification

Thank you!