The Best Practices of DeviceLink Technology

Simple as Calibration curves
or
Complex as MultiColor Generation
Overview

- What is a Device Link
- Use Cases for Device Links
- How to generate Device Links
- How to use Device Links
- Examples
What is the Problem?

- Limitations of standard ICC conversion

- Example: 0/0/0/100 CMYK - to - 54/40/43/90 CMYK
What is the Solution?

- **Device Link Profiles**

- **Example:** 0/0/0/100 CMYK - to - 0/0/0/100 CMYK
Functionality of Device Link Profiles

▪ Direct Conversion between Device Color Spaces

▪ Device Links can be combined with other profiles
Problem solved!

- Just curves or any correction is possible
- Respects Channel Properties
- Based on ICC standard and highly compatible
- Higher Accuracy than Device Profiles

Coffee break, we are all set!
One more thing…

- How does a Device Link function
- How to create them
- Where to use them
Device Links - Technically

CMYK → Curves → LUT → Curves → 7CLR

CMYK to 7CLR
How to create Device Links

▪ Calculate from Device Profiles
▪ Calculate from Measurement data
▪ Generate from formula
▪ From manual editing
▪ Clone conversions
▪ Modify existing Device Links
Now let's talk about Use Cases...
THE GOOD, THE BAD AND THE UGLY

FLORIDA
Good Use Cases for Device Links

- **Calibration curves**
  (G7, single ink limit, tone value editing)

- **Color Space Conversion**
  (standard and custom conversions)

- **Ink Saving**
  (CMYK+ color spaces)

- **Ink Limiting**
  (CMYK+ color spaces)
Good Use Cases for Device Links

- **Iterative Optimization**
  (Proofing, Fine-tuning)

- **Device Synchronization**
  (Advanced calibration)

- **Spot Color Conversion**
  (Merge spot color into a color space)
Bad Use Cases for Device Links

- RGB Color Conversions
- Monitor Display
Ugly Use Cases for Device Links

- **Color Correction / Editing**
  (Automation)

- **Cloning of Workflows**
  (Automation)
Where to use Device Links

- ICC Device Links are supported by any ICC CMM
- Adobe Photoshop (limited support)
- RIPs, Color Servers
- Other applications such as callas PDF Toolbox, Enfocus PitStop, …
When to use Device Links

- Properties of the color channels must be respected
  (Maintain channel purity, black channel)

- Conversion between standardized color spaces
  (GRACol-to-SWOP)

- Automate manually fine-tuned conversions
  (Apply same editing to all photos)

- Conversion must be optimized/iterated
  (Proofing)
Device Link Advantages

- Profile Size
- Integration of Custom Conversions
- Respects Properties of Process Colors
- Accurate at Gamut Border
- Ready to Use
Profile Sizes

- Device Profiles contain unused data
- Typical Profile Sizes:

<table>
<thead>
<tr>
<th>Source Color Space</th>
<th>RGB</th>
<th>CMYK</th>
<th>5CLR</th>
<th>6CLR</th>
<th>7CLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Profiles (*)</td>
<td>0.1-1 MB</td>
<td>1-2 MB</td>
<td>1-3 MB</td>
<td>2-4 MB</td>
<td>2-10 MB</td>
</tr>
<tr>
<td>Device Link Profiles</td>
<td>0.1-0.3 MB</td>
<td>0.1-0.4 MB</td>
<td>0.1-0.5 MB</td>
<td>0.2-1 MB</td>
<td>0.4-2 MB</td>
</tr>
</tbody>
</table>

(*) Requires at least 2 Profiles
Link complex Conversions into one Profile

C_{MYK_1} \xrightarrow{\text{Correction}} C_{MYK_2} \xrightarrow{\text{Calibration}} C_{MYK_3} \xrightarrow{\text{Conversion}} C_{MYKOGV}
Preserving of Channel Properties

Standard ICC Conversion

Advanced Device Link Conversion
Lab Space vs. Natural Color Values

Gamut border crosses the grid

0-100% Colors are grid points
Device Link Limitations

- Multi Color Input
- No Embedding
- Verification is difficult
- Limited flexibility
What to do with what you’ve learned?

- Device Links may serve different use cases
  - Linearization/Curves
  - Ink Optimization
  - Color Space Conversion
  - Combine complex conversions in a single profile
  - Automation of repetitive procedures
- Device Links are ICC standard and supported by many tools
- Device links can be good, bad and sometimes a bit ugly...
Finally…

- Coffee break now?
- Or any questions?
- Feel free to discuss further at our table in the Vendor's area...
Thank you for attending!