

Advanced Color Management workflow for Inkjet applications

ICC COLOR EXPERTS DAY

MAY 24, 2019

Colour Management for
Wider-Format Printing
on Non-Paper
Substrates

Hosted by Barbieri Electronic



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Bressanone, Italy

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Product Manager
ColorLogic GmbH



High-End **Color Management Solutions**

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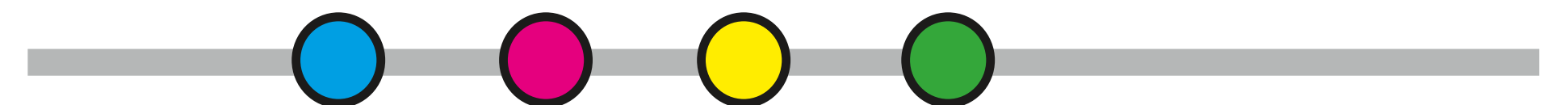


GENERAL CHALLENGES

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

Create Transition Curves Transition

Auto Custom Linearization Ignore Option Errors

Cyan - Light Cyan

Latest Start of Dark Ink Auto -30

Maximum Tint for Dark Ink Auto 75

Maximum Tint for Light Ink Auto -60

End Tint of Light Ink Auto 20

Magenta - Light Magenta

Add Additional Parameter

InkSplitChannels 4 6 0 4 1 5

InkSplitLinearization 0

InkSplitCurves 0 4 -30 Auto -60 Auto 1 5 -30 Auto -60 Auto

< Previous Close Calculate

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LINEARIZING

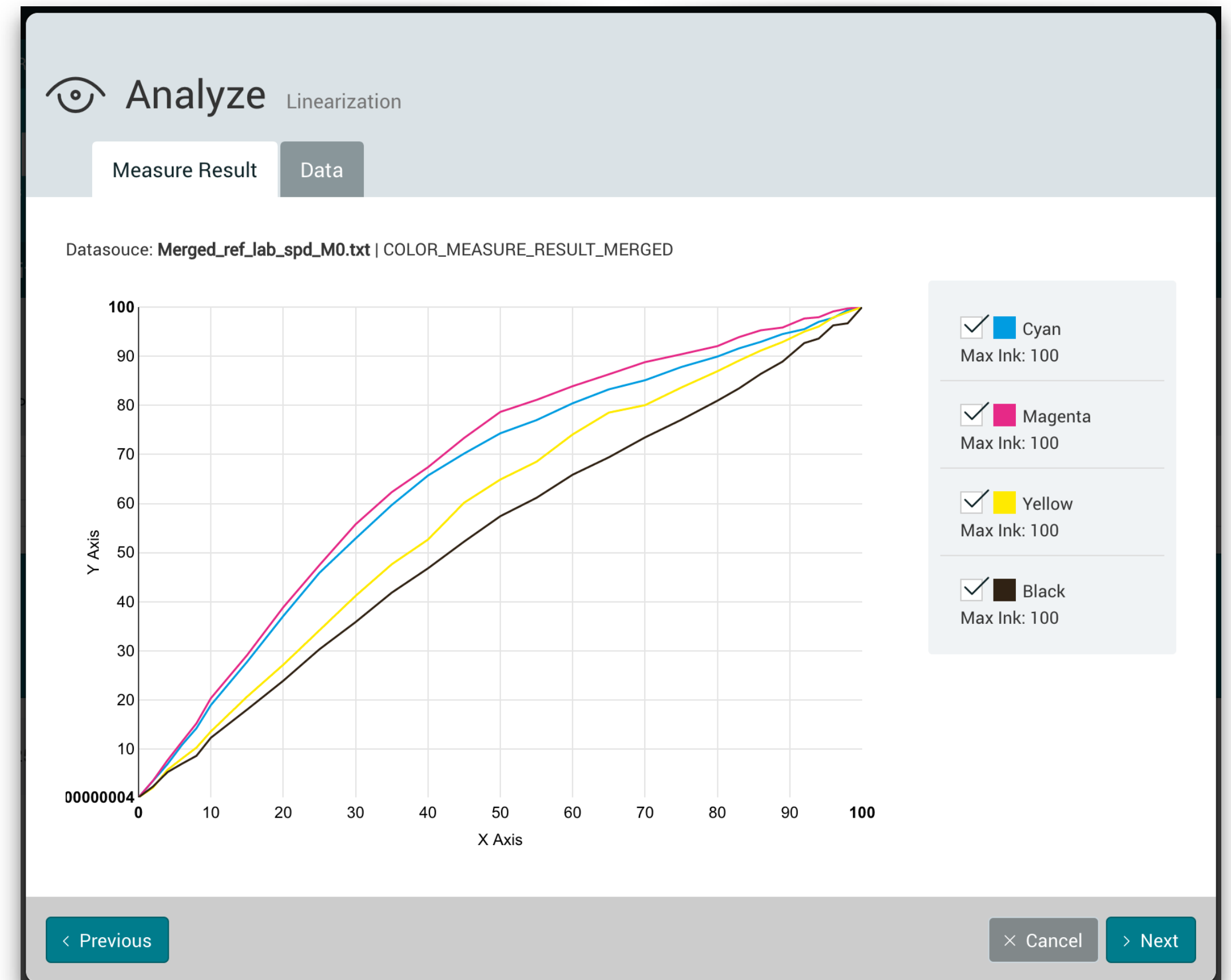
▶ Not linearized raw curves are often bumpy and have way to high dot gain

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

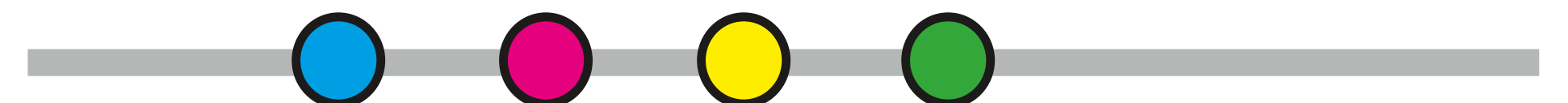
▶ Often a channel wise ink limit is necessary

▶ Calculated linearization curves should be smoothed to avoid over compensation

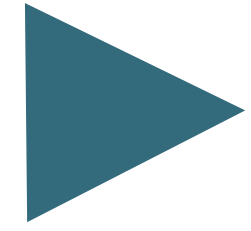
▶ The entire color management should be in 16 bit



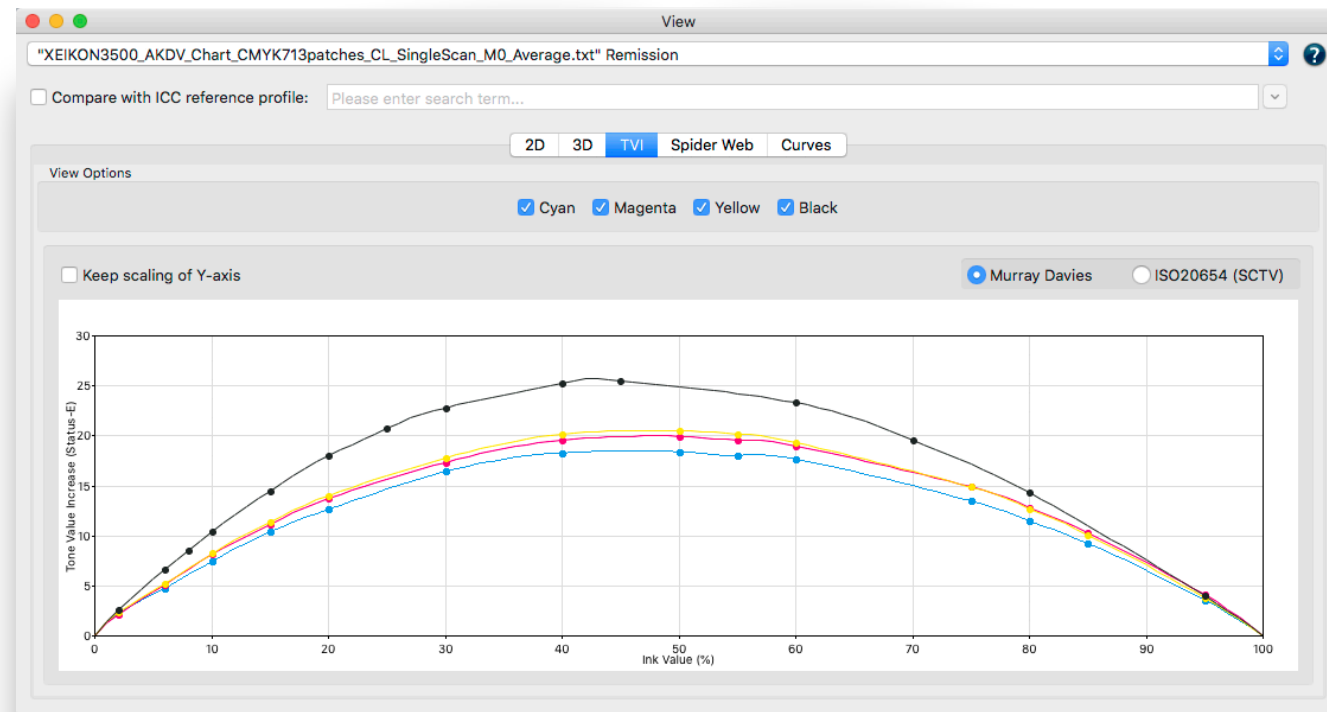
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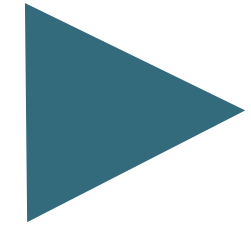
Colorimetric linearizing (ISO 20654 - SCTV) is much better suited for ink jets than density based methods



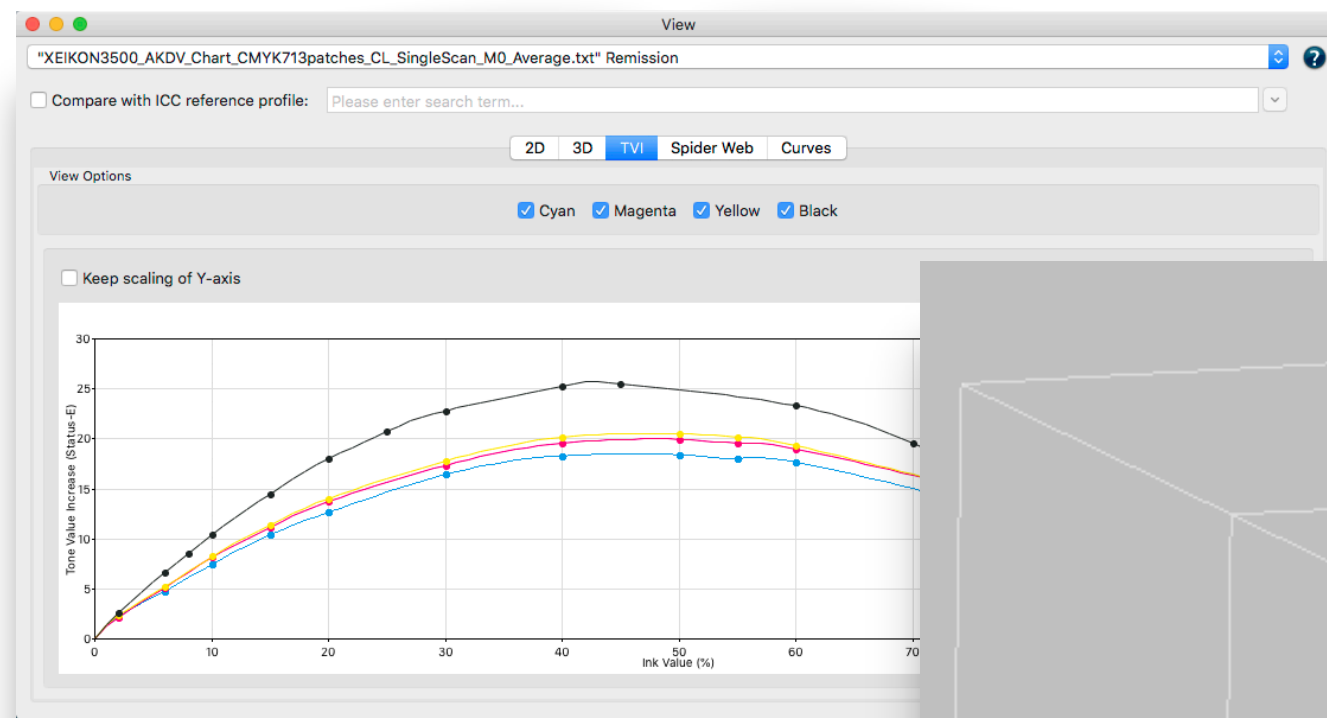
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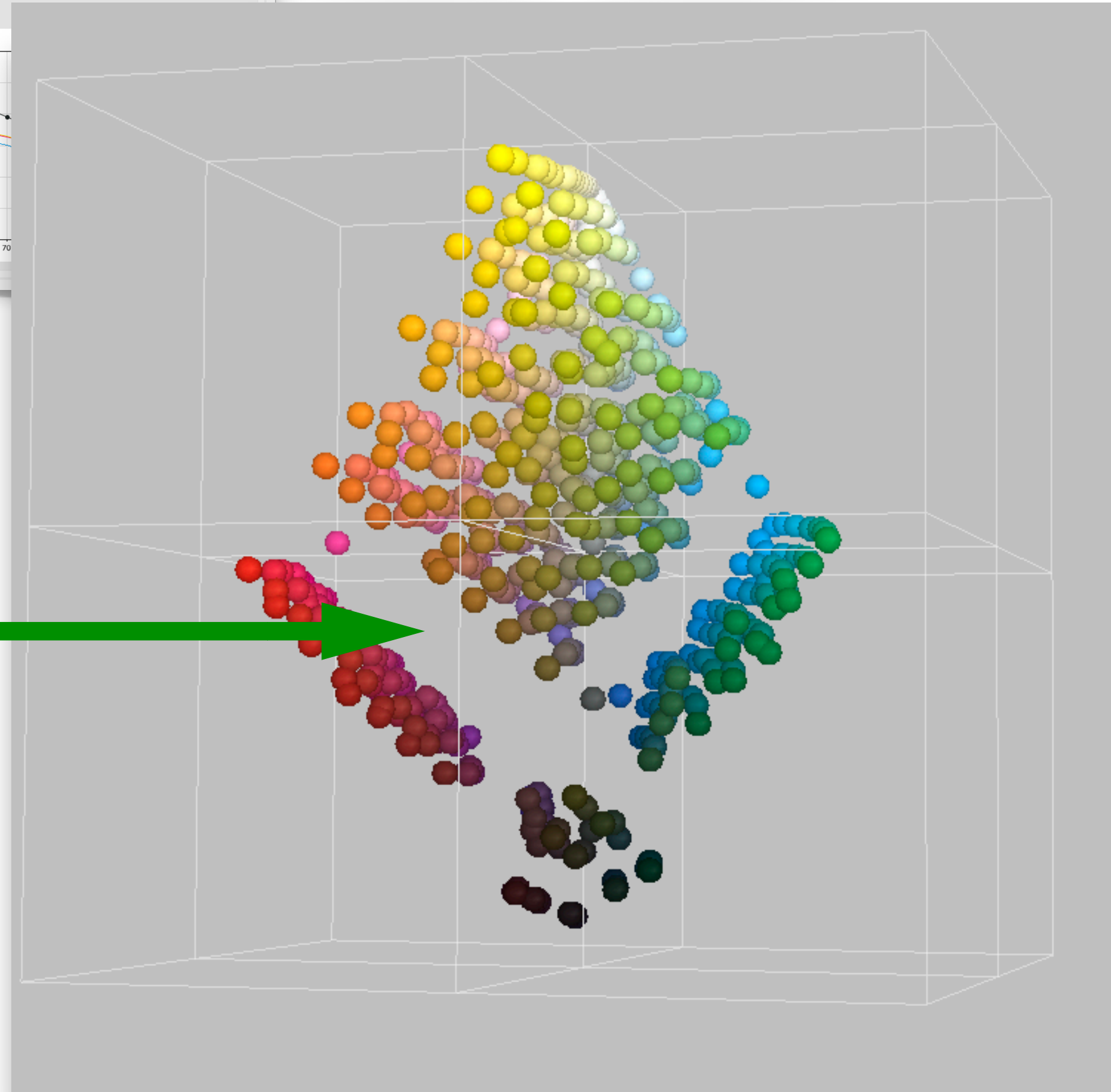
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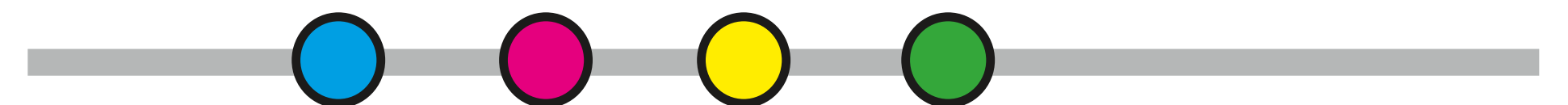
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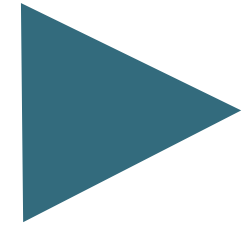
Big holes in the gamut due to density based linearization



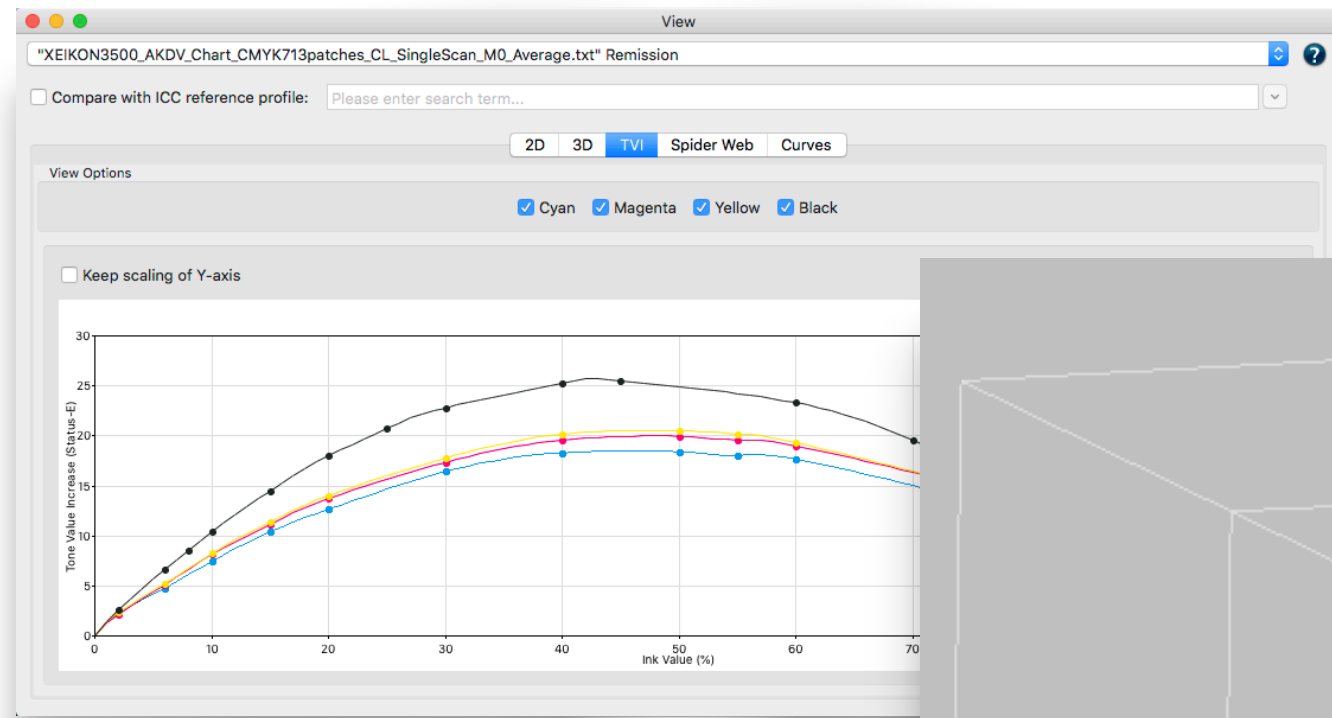
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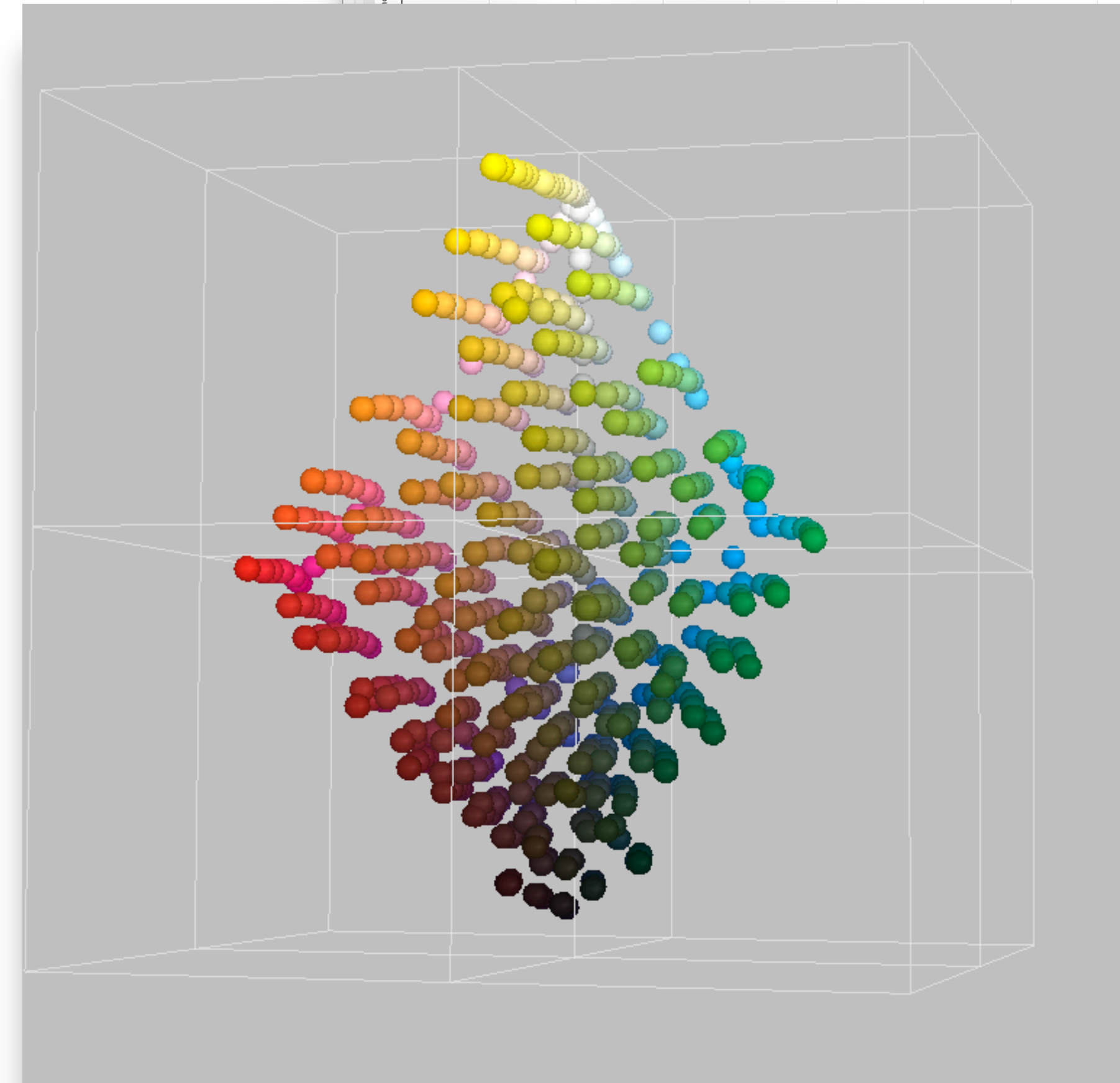
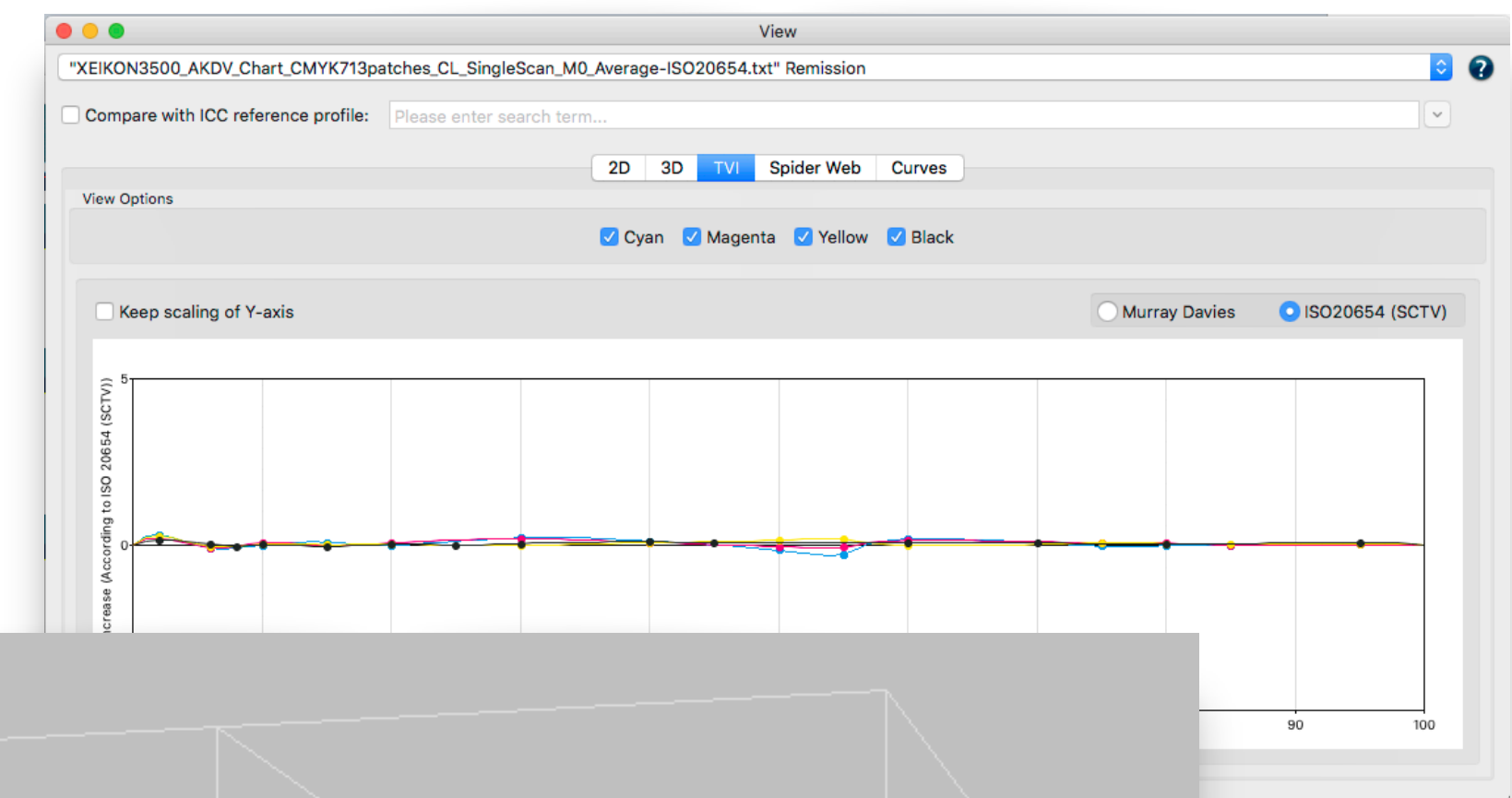
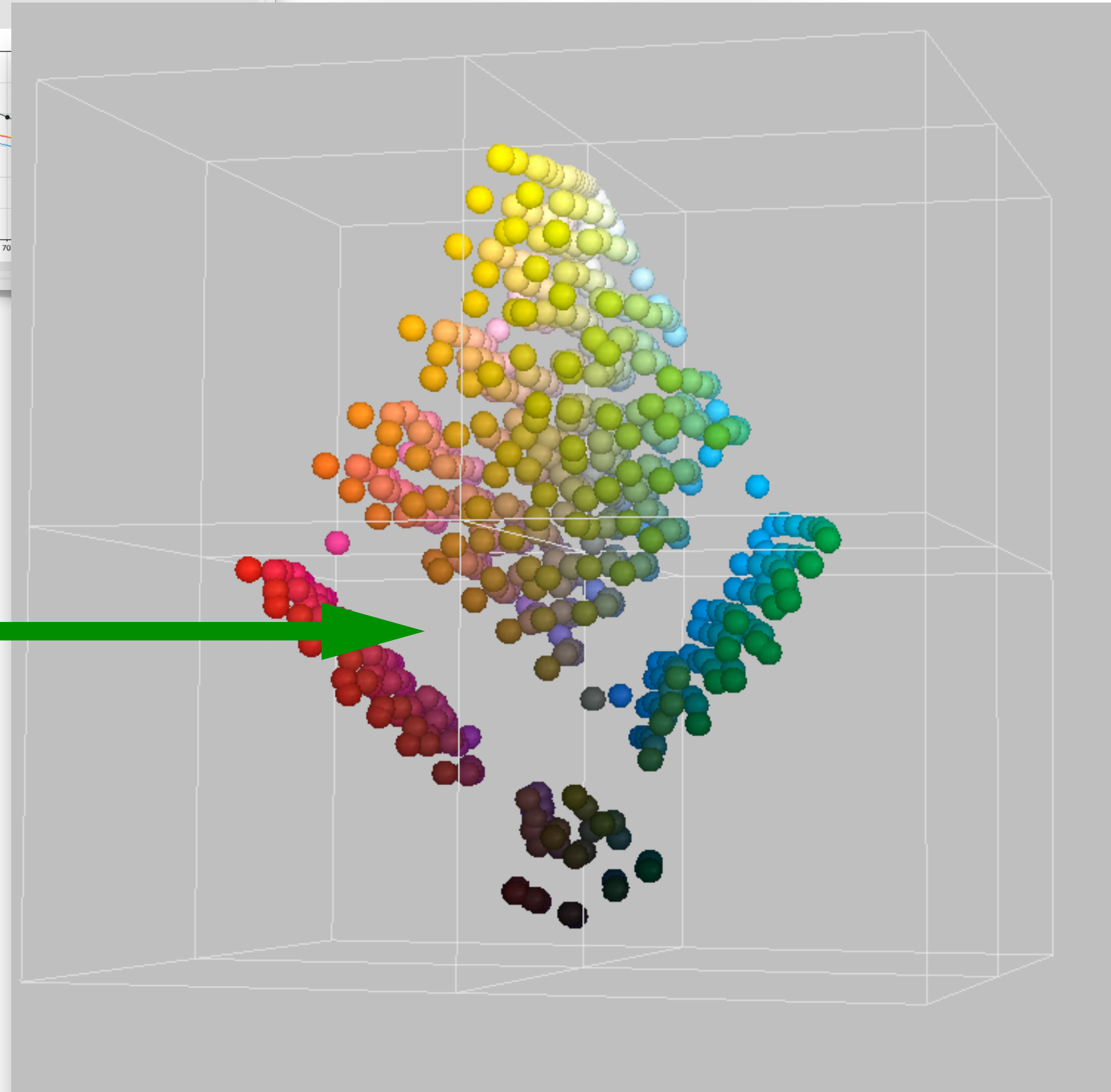
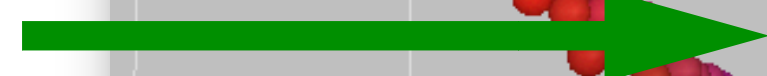
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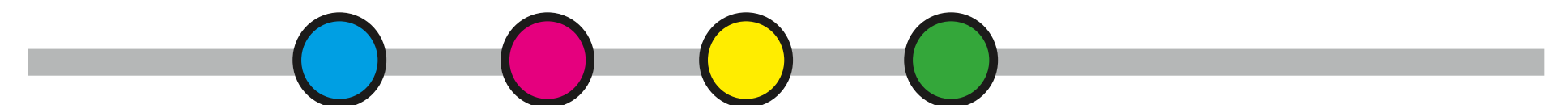
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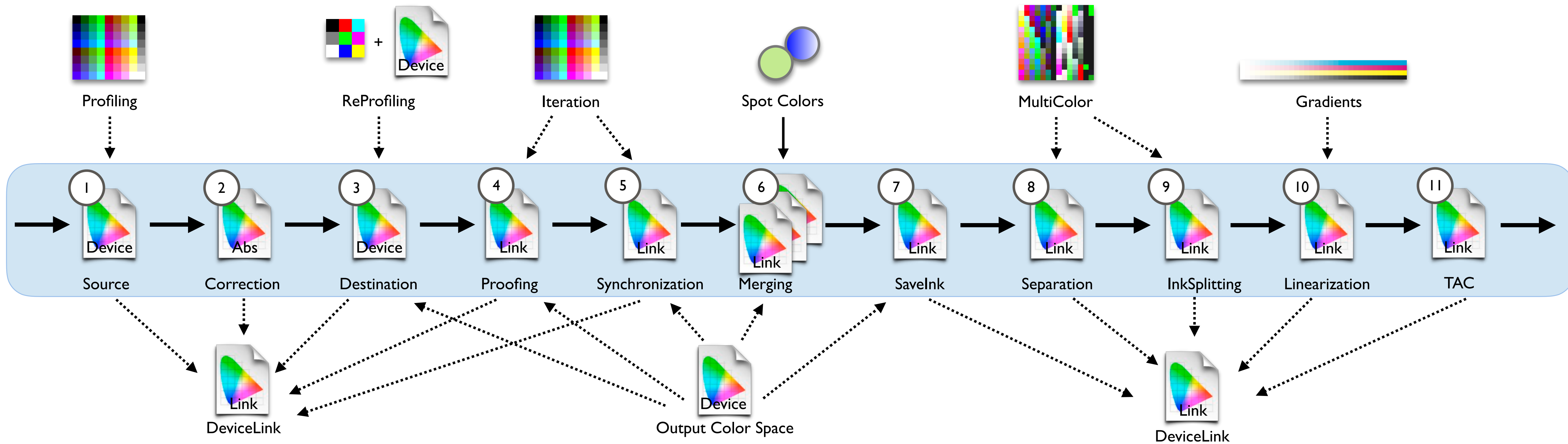
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COMPLETE COLOR MANAGEMENT WORKFLOW



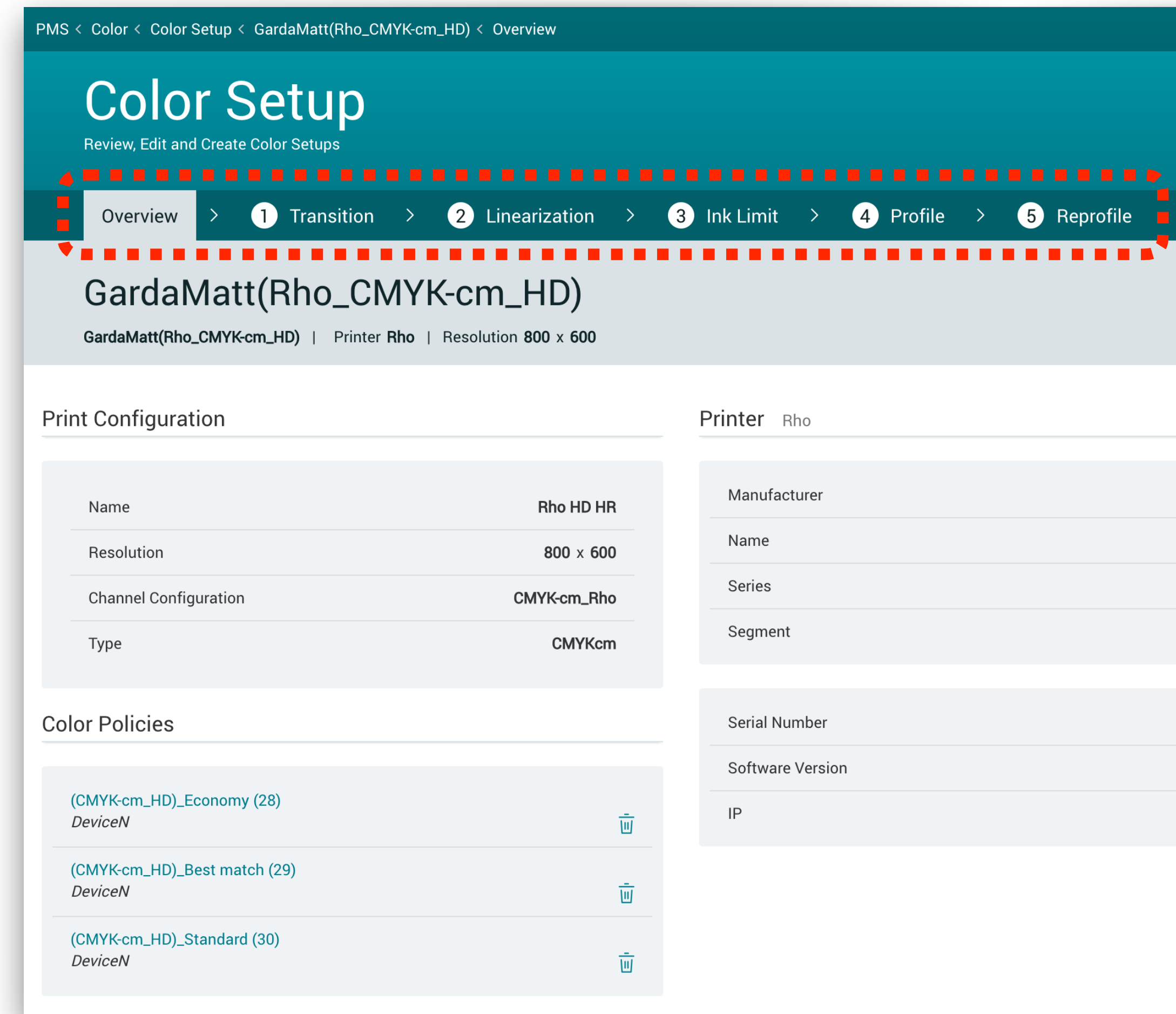
- This view shows the possible color management steps for one input color space
- Multiple input color spaces will typically be merged after step 3
- Many components are optional and may only be necessary for very high requirements
- Some steps (e.g. 9,10,11) may be conducted in a different order

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OVERVIEW: DURST WORKFLOW*

- ▶ Calibration and profiling is done in a Wizard like user interface
- ▶ Transition/Linearizing – Ink Limiting – Profiling – Reprofile
- ▶ 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



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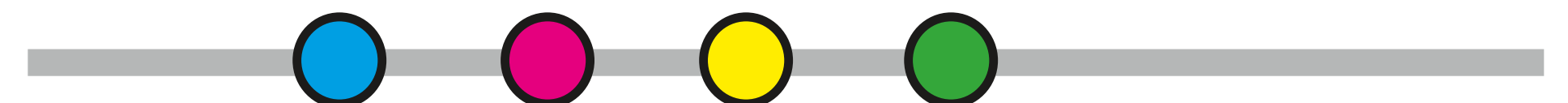
*The Durst Workflow is available for label, textile and corrugated applications

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 scarifying 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

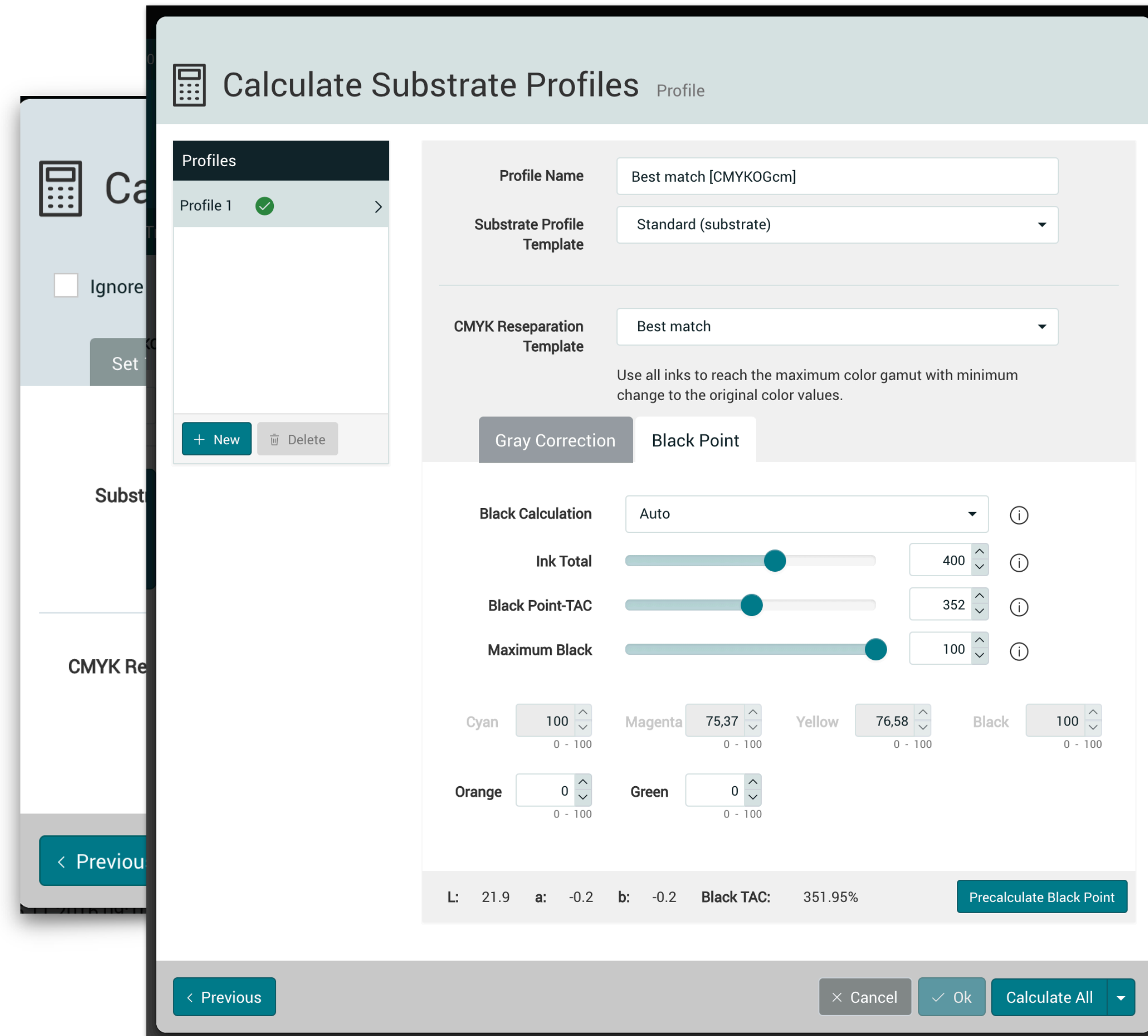
The screenshot shows a software window titled "Calculate Substrate Profiles" with a "Profile" tab. At the top, there is a calculator icon and a checkbox for "Ignore Option Errors". Below this are three tabs labeled "Set 1", "Set 2", and "Set 3", each with a close button. The main form contains three input fields: "Profile Name" with the value "(CMYK-cm_HD)_Economy", "Substrate Profile Template" with the value "Standard (substrate)", and "CMYK Reseparation Template" with the value "Economy". Below the last field is a note: "Use less inks to reach the minimum ink consumption. Use maximum black (K) instead of CMY inks." At the bottom of the window, there are two buttons: "< Previous" on the left and "Close" on the right.

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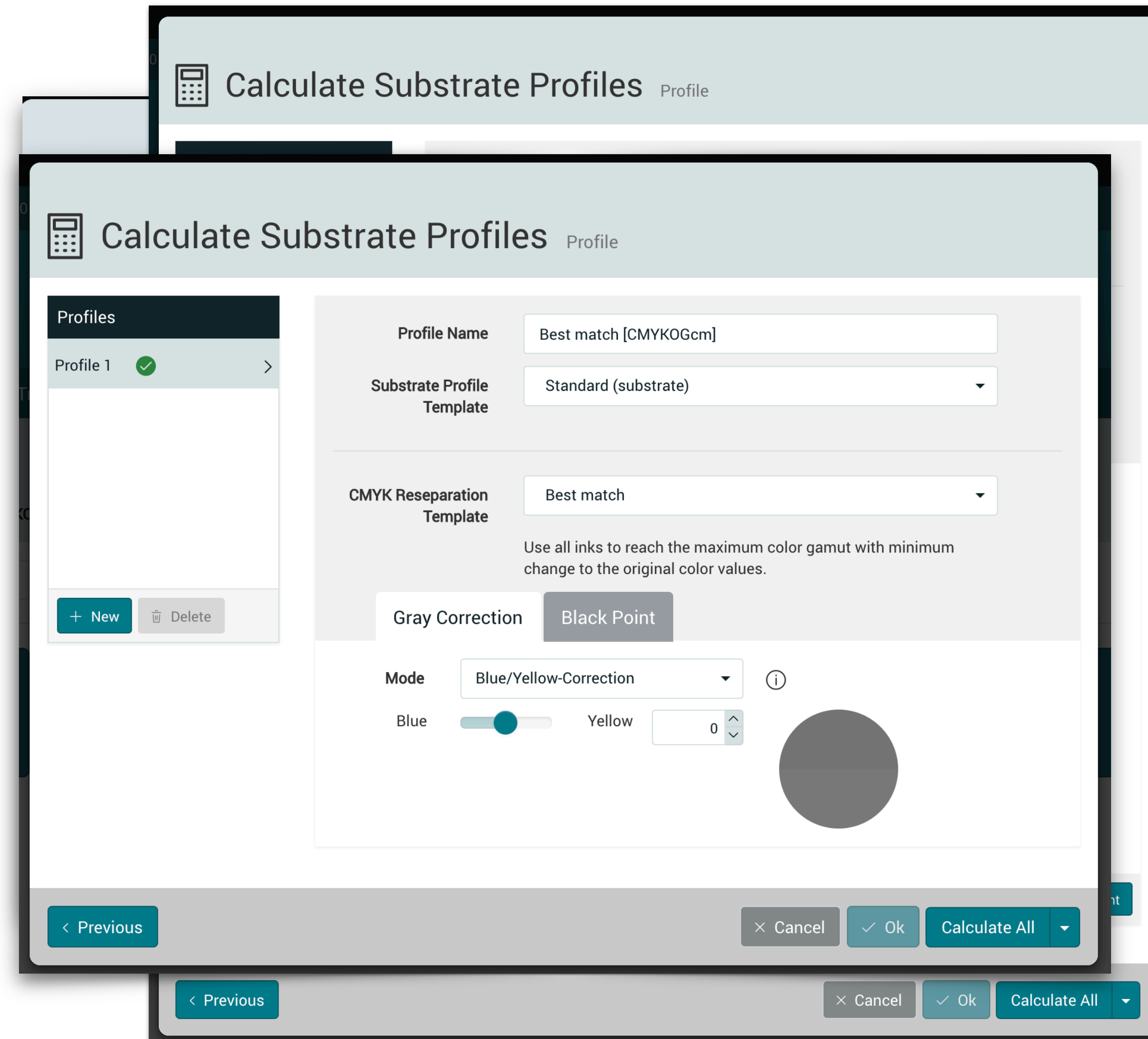


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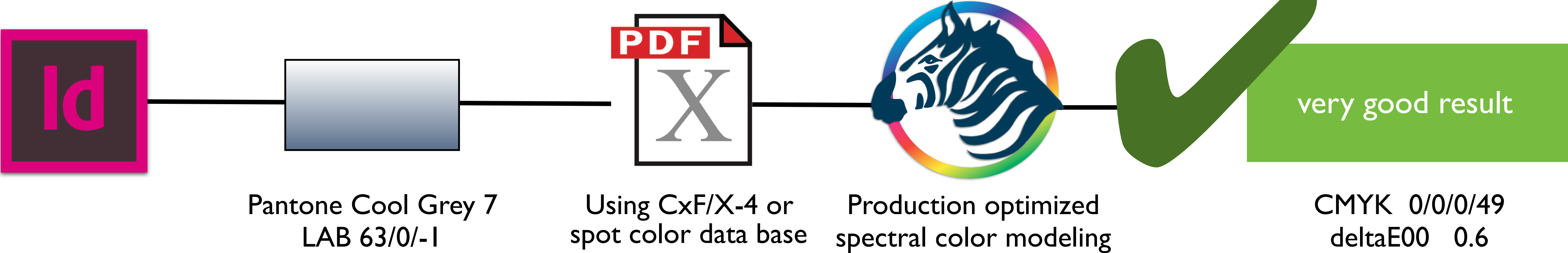
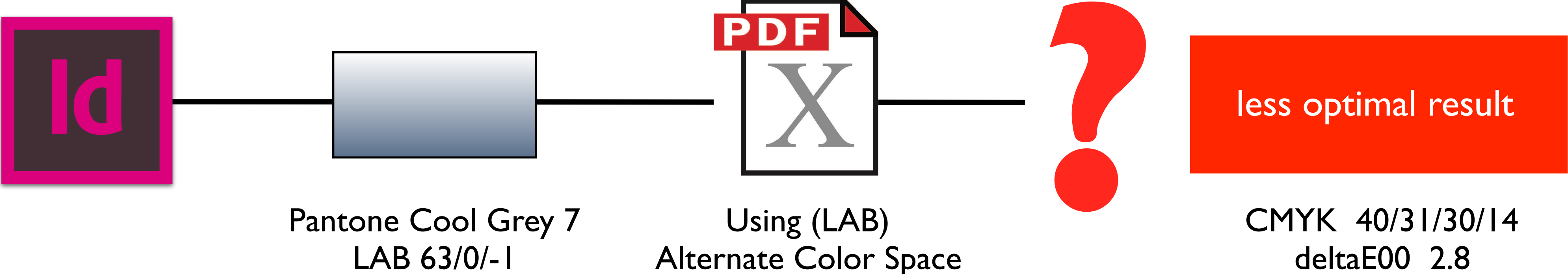
- ▶ Reprofileing with Correction DeviceLink profiles
- ▶ Only a little color wedge needs to be printed to "record" the printer/paper deviations
- ▶ Allows matching reprints
- ▶ Provides more stability and simplifies process control

The screenshot displays the 'Color Setup' interface for a Durst printer. The breadcrumb trail at the top reads: 'PMS < Color < Color Setup < GardaMatt(Rho_CMYK-cm_HD) < Profile'. The main title is 'Color Setup' with the subtitle 'Review, Edit and Create Color Setups'. A navigation bar contains five steps: 'Overview', '1 Transition', '2 Linearization', '3 Ink Limit', '4 Profile', and '5 Reprofile'. The '4 Profile' step is highlighted with a red dashed border. Below the navigation bar, the 'Profile' section is titled 'GardaMatt(Rho_CMYK-cm_HD) | Printer Rho | Resolution 800 x 600'. There are two dropdown menus: 'Select a Measurement Device' and 'Measurement Parameter Set'. Below these are two main action buttons: 'Print' and 'Measure'. The 'Print' button has a grid icon, and the 'Measure' button has a printer icon. Below the buttons, there are two columns of activity logs. The left column shows a single entry with a checkmark and the timestamp '25.11.2016 09:10:58'. The right column shows four entries, each with a checkmark and a timestamp: '25.11.2016 09:35:13', '25.11.2016 09:29:09', '25.11.2016 09:23:07', and '25.11.2016 09:17:05'.

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CONVERSION OF SPOT COLORS



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COLORLOGIC TECHNOLOGY

"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>



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