Alwan LinkProfiler ™ Manual

Spot on proofs
and press to press match

18 May 2004

Content

I. Introduction

Alwan LinkProfiler is a profiling software that allows you to create sophisticated and accurate ICC DeviceLink Profiles.

It includes many innovative and original features not found on other profilers.

I.1. Addressed Problems

If a CMYK file is to be color managed for a destination CMYK digital proofer or printing press using ICC Device profiles, source CMYK data will be converted to CIELAB using the source ICC device profile, and then CIELAB colors are converted to destination CMYK values using the output ICC device profile.

In this operation, important information about the source file contents can be lost.

For example, source pure C, M, Y or K color elements like text, color tints, vector graphics etc... are converted to 4 color CMYK on the output.

This can practically cause undesirable artifacts on the proof like grainy and dirty colors or misleading information like wrong dot structure.

On the printing press this CMYK->CIELAB->CMYK transformation may cause undesirable effects and even printability problems.

If black text or line art turn into CMYK, they will be very difficult to register, will have unsharp borders and will require more ink to print.

I.2. Benefits

Alwan LinkProfiler[a] ICC DeviceLink Profiles ensure:

- Improved digital proof color and visual match
- Accurate Press to Press color match
- Optimal output Black generation and TAC (total area coverage) for the destination printing press
- Maximum Black option for maximum ink savings
- Preservation of C,M,Y,K, CM, CY, MY colors purity with dot gain compensation
- Preservation of achromatics
- Preservation of CMY colors under solid black
- Preservation of solids and registration marks
- Choice or rendering Intent
- Choice of black point compensation

I.3. Competitive Advantages

The best ICC DeviceLink Profiles for demanding production environments.

- Spot on digital proofs

- No more registration problems due to 4 color primaries

- Ink Savings on the printing press

- Total control on the output black generation and TAC with any ICC compliant output device profile

- Developed, tested and validated in demanding press printing environments

- Used to produce ICC based proofs and prints for multi-million circulation titles

II. About DeviceLink Profiles

The International Color Consortium ICC Device Profile has become very popular and is widely used for color conversions from color space to color space.

(you can find a detailed description of the ICC architecture in Alwan ColorPursuit documentation at http://www.alwancolor.com/ressources/doc_colorpursuit/cp_introduction.pdf)

RGB acquired images can be converted to a Calibrated RGB using the Source Device (Digital Camera, Scanner…) RGB profile and a Destination Calibrated RGB Profile (Adobe RGB, ECI-RGB, sRGB…).

RGB images can also be converted to CMYK using Source Device (Digital Camera, Scanner, Calibrated RGB, Color Space…) RGB profile and Destination Device (Printer, Press…) CMYK Profile.

CMYK images intended to be printed on a Press can be accurately proofed on a Digital Printer using the Source Press profile and Destination Proofer Profile.

CMYK images intended to be printed on Press A can be accurately proofed on Press B using the Source Press A profile and Destination Press B Profile.

All these examples and many others are used daily by thousands of satisfied operators and clients.

However, in some situations, the standard ICC Device Profile processing carries some limitations that can yield to color and visual mismatch as well as to some printability issues on the press.

II.1. Color mismatch

In a standard Device to Device ICC transformation, Input Device values are used with the chosen Input Profile table to calculate PCS values (CIELAB or CIEXYZ), then the chosen Output Profile table is used to calculate the Output Device values.

In this scenario, profiles tables are used as is, meaning that the accuracy of the proofs will also depend on the ability of the original profile builder to generate accurate output tables.

This is not always the case

II.2. Visual mismatch

Eventhough most printers do have high printing resolution, their effective screening resolution can be relatively low.

For some saturated and dark colors, black dots that are needed to generate the color do not appear on the press print but may appear on the proof with the chosen Proofer Profile.

The only way to solve this problem is to re-generate the black channel of your proofer profile to avoid this kind of artifact.

Another example of Visual mismatch is primary colors (CMYKRGB becoming CMYK on the proof after the ICC transformation.

Eventhough proof colors may match very well those of the press, their appearance does not necessarily match.

Overmore, having a 4 color Cyan or black on a proof can be very disturbing for a Quality Control operator or a press minder.

II.3. Printability problems

If your files are separated for Press A but you finally decide or have to print on Press B which is very different, the standard ICC solution would be to use Press A Input Profile and Press B Destination Profile and color convert you files to obtain a consistent result.

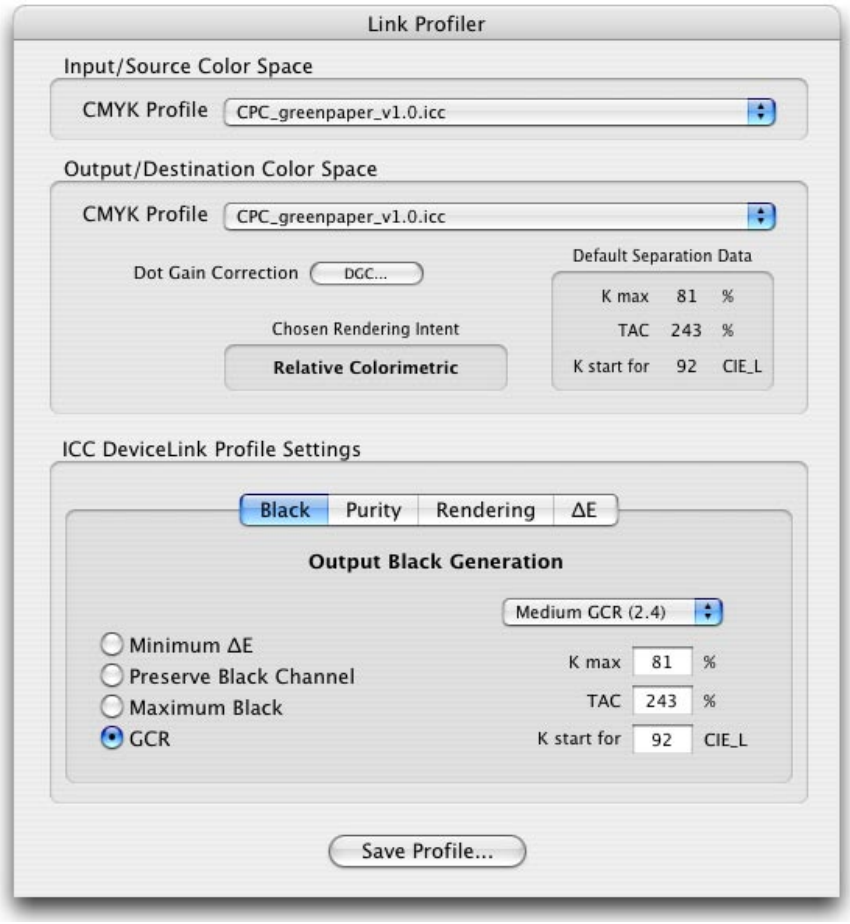
The problem with this operation is that ICC PCS values do not carry any information regarding the nature of the different file components.

Black text and primary CMYK colors used for text, graphics, vignettes, drop shadows etc… are lost and all these page elements become CMYK on the output.

This is not a natural characteristic of CMYK files and plates and the consequence can vary from difficult to impossible registration and printing on the press.

All these problems and many others that will be described later can be solved by using Alwan LinkProfiler CMYK_To_CMYK ICC DeviceLink Profiles building technology.

III. Alwan LinkProfiler Interface



III.1. Input/Source Color Space

III.1.1. CMYK Profile

Here you can select the ICC Profile which corresponds to:

- your target press, if you are building a Profile for your proofer

- the press profile used for the color separation of the files that you wish to process with the DeviceLink Profile

III.2 Output/Destination Color Space

III.2.1. CMYK Profile

Here you can select the ICC Profile which corresponds to:

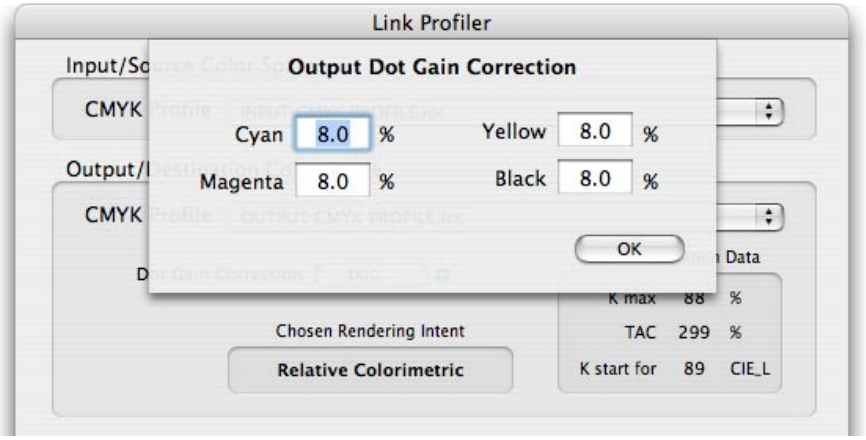
- your proofer, if you are building a Profile for your proofer

- the destination press which will be used to print the files that you wish to process with the DeviceLink Profile

III.2.2. Dot Gain Correction

Dot Gain Correction: Allows you to apply a dot gain type of correction to a queue.

Click on the **DGC... button**.



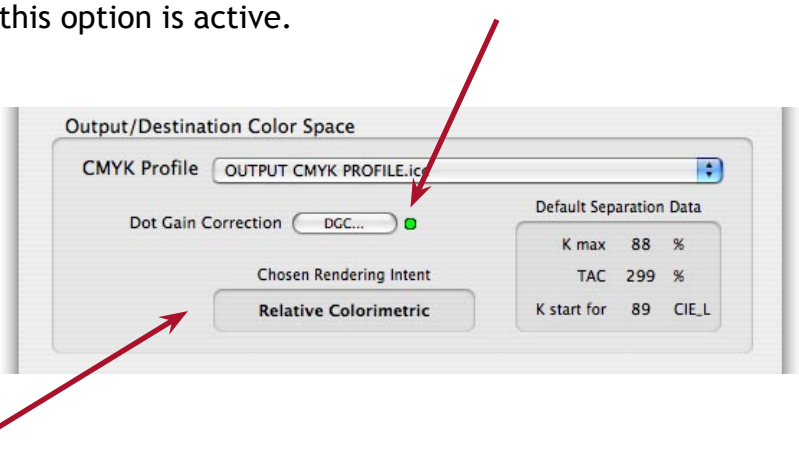
The displayed window allows you to choose the amount of needed correction at 50% dot area.

A 10% in the Cyan text box for example means that a 50% Cyan value obtained after the ICC Transformation will be increased by 10% and will become 60%. A dot gain curve corresponding to this peak +10% value at 50% dot area will be applied to the Cyan channel ie +9% for a 40% patch, +8% for a 30% patch etc….

A -10% in the Cyan text box means that a 50% Cyan value obtained after the ICC Transformation will be decreased by 10% and will become 40%. A dot gain curve corresponding to this peak -10% value at 50% dot area will be applied to the Cyan channel ie -9% for a 40% patch, -8% for a 30% patch etc….

DGC is very practical to modify files dot gain to adapt to the actual printing substrate dot gain without having to build a specific ICC profile for each paper variety and gramming in a paper category.

When one or more DGC values are non zero, a green light will display on the right of the DGC button to indicate that this option is active.



III.2.3. Chosen Rendering Intent

It displays one of the four ICC Rendering Intents, and it corresponds to that of thedepending on the Rendering tab selection (see part III.3.3.)

III.2.4. Default Separation data

The displayed information on the right is extracted from the selected **CMYK Profile** and is a property of this ICC Profile.

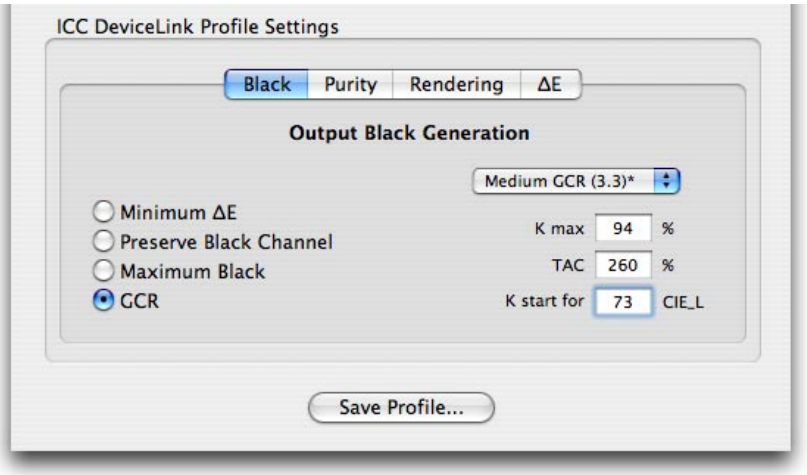
- **K Max** indicates the maximum amount of Black obtained in the Output separation

- **TAC** which means Total Area Coverage indicates the maximum amount of CMYK overprint obtained in the Output separation

- **K start for CIE_L** indicates the lightness of the color where Output Black generation starts

III.3. ICC DeviceLink Profile Settings

Four tabs enable you to customize the characteristics of your device link profile:



III.3.1. Black tab:

The **Black tab** allows you to take full control on the output CMYK files black generation.

The original Default separation Data tables are ignored and new tables are calculated in accordance with the chosen Black Generation options.

• Minimum ΔE

No specific Black Generation constraint or law is used to build the profile table. Output CMYK values are calculated to give colors that match the Input CMYK values colors within a ΔE chosen from the **ΔE tab**.

TAC default value is that of the original Output Profile. You can leave it as is or modify it if you wish another TAC limit.

This option can be very useful for accurate Proof production but is not recommended for Press Output because it can give unusual Black plates.

• Preserve Black Channel

This option allows you to preserve the Black channel (hence the black plate) of the Input file.

Only Output CMY values are calculated for color matching.

TAC default value is that of the original Output Profile. You can leave it as is or modify it if you wish another TAC limit.

• Maximum Black

This option allows you to use the maximum amount of Black ink possible on the printing press without visible compromise on print quality, especially shadows and three quarter tones details.

- **K Max** indicates the maximum desired amount of Black obtained in the Output separation

- **TAC** which means Total Area Coverage indicates the maximum amount of CMYK overprint obtained in the Output separation

- **K start for CIE_L** indicated the ligntness of the color where Output Black generation starts

- **Ink Saving option** allows you to use the maximum amount of Black ink for your press without loss of details in shadows and three quarter tones.

MIN setting is quite equivalent to Maximum GCR (see next paragraph).
MAX setting allows you typically to save between 10% and 30% more ink compared to to conventional Maximum GCR.

• GCR

- **GCR** (Gray Component Replacement ie Black replacing CMY grays in the separation) **popup menu** allows you to choose the strength of Black replacement.

The range of selection is very wide, from No Black (CMY only) to Maximum Black replacement (practically all equal amounts of CMY are replaced by equivalent black).

- **K Max** indicates the maximum desired amount of Black obtained in the Output separation

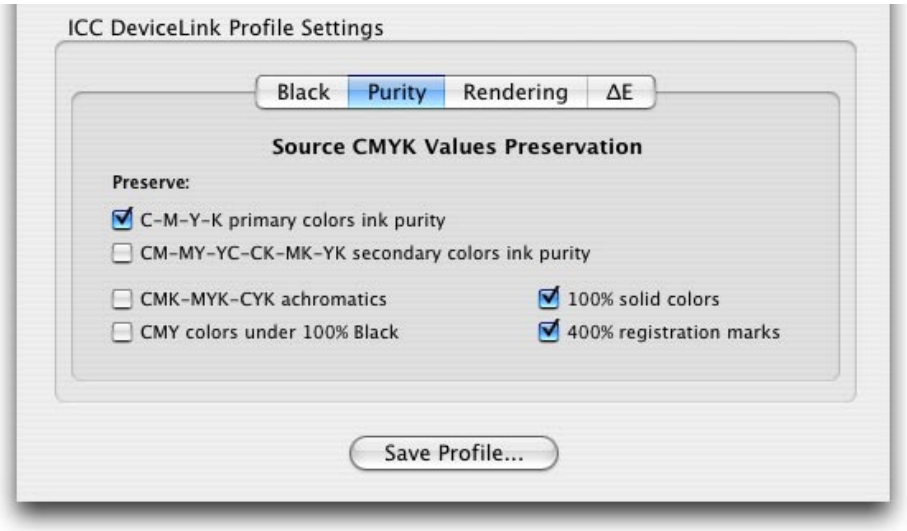
- **TAC** which means Total Area Coverage indicates the maximum amount of CMYK overprint obtained in the Output separation

- **K start for CIE_L** indicated the ligntness of the color where Output Black generation starts

III.3.2. Purity tab

This tab lets you set constraints on the output separation in order to preserve the integrity of some of the input files characteristics.

This will allow you to avoid printability issues and problems on the press.



Ticking the corresponding box will allow you to Preserve:

C-M-Y-K primary colors ink purity: All input C,or M or Y or K only colors of any value will remain pure C,or M or Y or K, only dot gain compensation will be be applied.

For example a 50% Cyan on the input may become 54% Cyan only on the output.

The output color remained pure Cyan, but its value has been adjusted to take into account the (low) dot gain of the output press

CM-MY-YC-CK-MK-YK secondary colors ink purity: All input colors composed of 2 primary inks only will remain 2 primaries only on the output.

Only dot gain compensation will be be applied.

For example a C50-M50 (Cyan 50% and Magenta 50%) Blue Color may become C54-M56 on the output. The output color remained pure CM, but CM values has been adjusted to take into account the (low) dot gain of the output press

CMK-MYK-CYK achromatics: Tints that are composed of 3 primary inks including

Black will remain 3 primary with Black only.

Only dot gain compensation and black generation will be applied.

For example a C20-M20-K30 (Cyan 20% Magenta 20% and Black20%) may become

C18-M22-K23 on the output.

CMY colors under 100% Black: CMY input values will be color managed and

adjusted in the output separation keeping 100% Black untouched.

This option is very useful for international titles where CMY channels/plates are

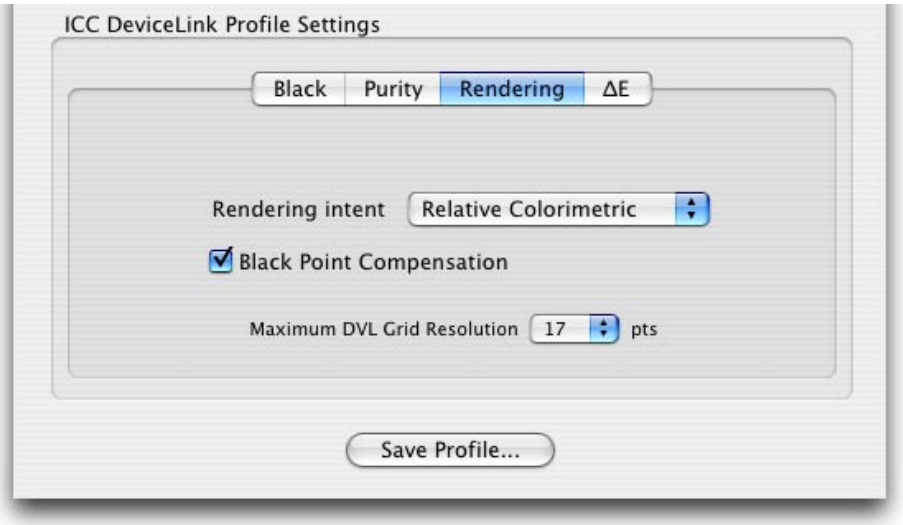
the same for all editions with only the Black text/plate changing.

100% solid colors: Input solids remain unchanged in the output separation

400% registration marks: Input files registration marks remain unchanged in the output separation

III.3.3. Rendering tab

This tab allows you to choose the ICC Device Profiles Rendering Intent tables that will be used to build the DeviceLink Profile.



Rendering intent: This popup menu allows you to choose one of the four ICC intents, Perceptual, Relative Colorimetric, Absolute Colorimetric and Saturation.

Choose the one that fits your purposes.

(you can find a detailed description of the ICC architecture in Alwan ColorPursuit documentation at http://www.alwancolor.com/ressources/doc_colorpursuit/cp_introduction.pdf)

Black Point Compensation: This option will compensate for the differences in dynamic range between Input and Ouput device gamuts.

Blacks and three quarter tones will not be clipped or lost if the Destination gamut is smaller than the Source Gamut.

Blacks and three quarter tones will not loose their visual deepness and contrast if the Destination gamut is larger than the Source Gamut.

Relative Colorimetric Rendering Intent with Black Point Compensation is probably the most widely used option for Press to Press Match.

DVL Maximum Grid Resolution: Allows you to choose CMYK Optimizer® DeviceLinkProfiles size.

The larger the chosen grid resolution, the larger the DVL profile, the longer the DVL Profile calculation time will be.

Default value is 17.

Optimal value is 17 if your computer processing power allows it.

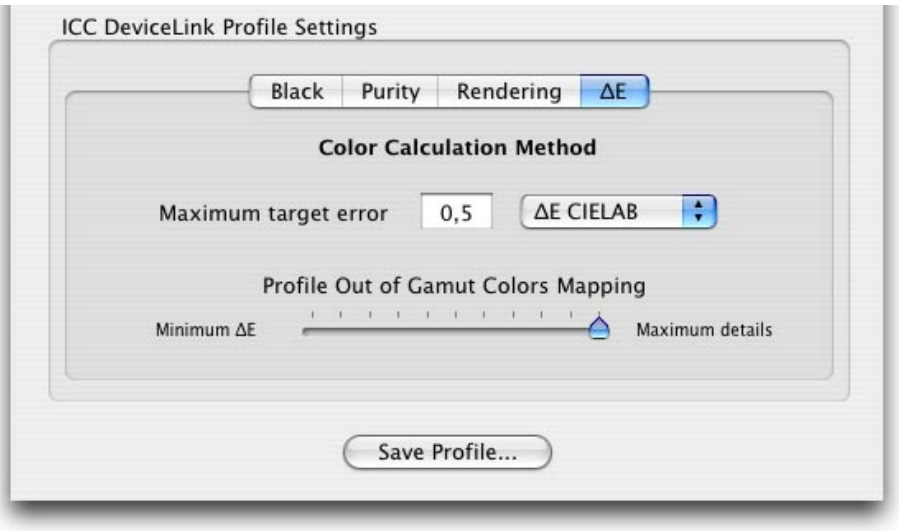
Available values range from 11 to 21 grid points DVL Profiles.

Note: CMYK Optimizer® DeviceLinkProfiles grid resolution is also limited by the source profile grid resolution.

The DVL profile grid points can not exceed the source profile grid points number.

III.3.4. ΔE tab

This tab allows you to set some of the parameters influencing the error calculation method used in the profile building process.



Please do not modify default values unless you know very well what you are doing.

Maximum Target Error: Defines the target ΔE for the DeviceProfile building calculations. Lower ΔE requires more iteration and makes Profile Building longer.

Default value is 0.5.

ΔE Formula: you can choose to use ΔE CIELAB or ΔE CIE 94 formula.

Default formula is ΔE CIELAB.

Profile Out of Gamut Colors Mapping: Input Profile may contain colors that are out of the gamut of the Output profile.

In this case and at profile building stage, a choice can be made whether to favor colorimetry or

color perception in the mapping operations.

Minimum ΔE will ensure that measured colors on the output will be as close as possible to corresponding input colors.

Maximum Details (default setting) will ensure that image details on the output will match as closely as possible those on the input.

http://www.alwancolor.com
http://www.alwancolor.com/english/products/linkprofiler.html