Double Strike : High Color Density Print Modes on Agfa :Anapurna engines.

Urgency	Classification	Scope	Comments
As required	Information only	All devices	

I. Introduction.

Our goal: The ideal and wanted UV Inkjet "Image & Color Quality setup"

- Sharp text:
  Positive up till point size 4
  Negative up till point size 6
- Soft but sharp images:
  Low level of noise
  Prefect reproductions, perfect dot placement
- No banding:
  No Gloss-, no Color- and no Media-feed banding
- Perfect colors:
  All type of substrates
  All printing modes
- Vivid colors:
  Where necessary, high density colors on opaque substrates
  High saturated colors on all kind of transparent substrates

II. Agfa Quality Level definitions.

- Production Mode:
  Limited banding and small print artifacts are allowed;
  Should not be visible at viewing distance of 5m.
- Poster Mode:
  Limited banding and small print artifacts are allowed;
  Should not be visible at a distance of 1.5m.
- Vector-Sign Mode:
  No banding and print artifacts when viewed at a distance of 1m (low level of graininess allowed, predominantly applicable to color solids).
- Photo/Vector-Sign Mode:
  Almost perfect: no banding, no printing artifacts, no visible grain when viewed at a distance of less then 0,5m.

III. The Agfa Color Gamut definition.

- The Goal is the "ISO 12647-5 Standard - Gamut class 2" color gamut for primary colors printed on opaque white self-adhesive vinyl.
- Agfa Anapurna UV-Inks are designed to match this standard as close as possible.

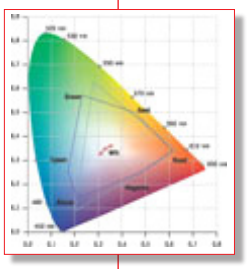


Table 3 — CIELAB coordinates of solid colours

Colour	Gamut class 1			Gamut class 2			Gamut class 3		
	L^* [a]	a^* [a]	b^* [a]	L^* [a]	a^* [a]	b^* [a]	L^* [a]	a^* [a]	b^* [a]
Cyan	59	−35	−43	52	−33	−51	46	−32	−54
Magenta	51	70	−15	47	74	−5	42	79	10
Yellow	90	−11	66	89	−9	83	88	−7	100
Black	24	0	0	18	0	0	8	0	0
Red [b]	50	59	42	47	67	50	44	66	47
Green [b]	55	−68	32	49	−65	30	43	−62	28
Blue [b]	28	27	−41	21	26	−40	16	29	−39

[a] Measured according to ISO 12647-1:1996, 5.6.
[b] Colour sequence yellow, cyan, magenta.

- All Agfa defined “Image Configurations” are set to map this ISO Standard. At least all Poster Configurations, regardless the type of engine, should meet those requirements
- Limitations could be:
  - Presence of image artifacts, such as banding (Gloss-banding, Hairline banding)
  - Type of substrate that is used:
    Absorbent vs. Non-absorbent material
    Opaque vs. Transparent material

1. A Basic Color Gamut setup.

Here we go for the optimum balance between Image artefacts versus wanted color gamut, Fogra/ISO or GraCOL (US Standard)?

2. A Wide Color Gamut setup.

Higher resolutions, meaning more printing passes, opens the possibility to achieve more saturated colors.
Allowing higher ink levels, when setting the inkrestrictions, means a higher color saturation, without introducing any kind of unwanted image artefacts.

- CMYK Images can still be matched towards the known standards (Fogra/ISO, GraCOL) while CMYK vector as well as RGB Images and vector data can be matched to a bigger color gamut.
- This is important, in order to achieve better spotcolor matching on all kind of opaque substrates.

3. The Double strike, extra Wide Color Gamut setup.

In order to achieve an adequate density on a backlit or transparent media, you had to boost the saturation of the image with an image editing software, or in Wasatch SoftRip by changing the color curves. This is not the most precise method of color management.

We now have the “Double strike function”, which allow us to lay more ink down on the substrate, it opens the possibility to reproduce “almost” all wanted colors, this on all kind of substrates opaque as well as transparent.

- If wanted, CMYK Images can still be matched towards the known standards (Fogra/ISO, GraCOL) while CMYK vector as well as RGB Images and vector data can be matched to a bigger color gamut

What’s double strike?

- Double strike is a function on the print engine itself.
- When activated, the dots that are printed in the right-to-left printing pass will be printed again on identical the same position at the moment that shuttle moves back to the home position. The media transport will only happen when the shuttle is back in the home position, the same functionality as when printing in a Uni-Directional mode. In other words, we can talk about Bi-Directional printing of the same dots at the same position without moving the substrate.

Supported on?

- The Double strike function is already supported on: Anapurna M4f .
- Soon available on :Anapurna Mv, :Anapurna M² and :Anapurna Mw.

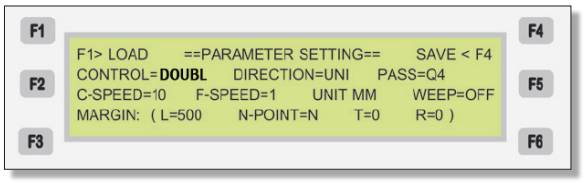
Benefits of the Double Strike function.

- Eliminates all kind of Bi-Directional banding.
- If wanted, perfect color match towards different color standards.
- High Color Density.
- In all printing modes and on all kind of substrates, opaque as well as transparent.
- “Almost” the same printing speed as the currently known Uni-Directional printmode.

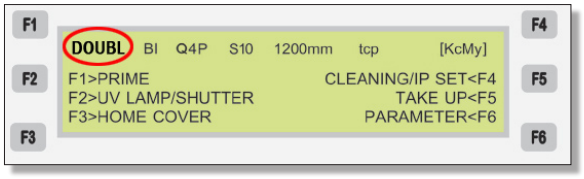
IV. Double strike - Implementation on :Anapurna M4f.

1. Engine setup.

- New engine firmware required, at least:
  - v2.904wa6shd for non-TCP versions of :Anapurna M4f.
  - v2.904wa6swd for TCP versions of :Anapurna M4f.
- The Double strike function needs to be set on the printers display:
  - Got to "Parameter"< (F6), and change the "control" to "DOUBL"



  - "DOUBL" will appear in the top window.



- From now on, as long as the engine is not restarted, all jobs will be printed in "Double Strike".
- Make sure the engine and printheads are well aligned

The Bi-Directional alignment needs to be accurately calibrated!

2. Wasatch setup.

In future SoftRip releases, double strike will become a function/button inside the different Image Configurations.

3. Wasatch Image Configurations.

On the :Anapurna M4f, it's known that it's very difficult to find the optimum balance between Image artefacts and the wanted color gamut.
The new "Double Strike" function is opening a lot of extra possibilities.

The Image configurations are split in 4 different groups:

- General Configurations
- Fabrics Configurations
- Clear Plexi Configurations
- Backlit Configurations

a. General Configurations:

- Intended to be used on all kind of opaque material, rigids as well as flexible media.
- Support on 4 different Image Quality modes:
  - Production mode:
    4 pass Bi-Directional printing mode.
    Same Image Configuration as currently in use on all released engines.
  - Poster mode:
    4 pass "Double Strike" with his own ICC profile.
    Thanks to the DS function, Color standards are now easily to reproduce.
  - Vector mode:
    8 pass "Double Strike" with his own ICC profile
    Perfect Standard Color reproduction of CMYK images,
    High saturated spotcolor reproductions
  - Photo mode:
    8 pass Uni-Directional printing mode.
    Same Image Configuration as currently in use on all released engines.

b. Clear Plexi Configurations: (Transparent media):

- Intended to be used on all kind of clear transparent substrates, such as plexi, glass. Experience has taught us that this application should be used as "mirror-print".
- Supported on 3 different Image Quality modes:
  - Plexi Speed:
    4 pass "Double Strike" ;
    Based on "General Production mode" Image Configuration;
    Sometimes some light banding can be observed, especially in dark colors;
    Color gamut is acceptable.

  - Plexi HighQuality:
    8 pass "Double Strike.";
    based on "General Photo mode" Image Configuration;
    Perfect Image reproductions, CMYK as well as RGB Images.

  - Plexi Max Saturation:
    8 pass "Double Strike" ;
    Based on currently released "Q8p_WideGamut" Image Configuration;
    Perfect reproduction of spotcolors, nice high saturated colors.

c. Fabrics Configurations:

- Intended to be used on all kind of fabrics/textiles. Experience has taught us that Image artefacts, such as banding, are very hard to observe on those media.
- Supported on 2 different Image Quality modes:
  - Fabrics Speed
    4 pass "Double Strike";
    Based on "General Production mode" Image Configuration.

  - Fabrics HighQuality
    8 pass "Double Strike";
    Based on "General Photo mode" Image Configuration.

d. Backlit Configurations (Translucent media):

- Intended to be used on all kind of backlit substrates. Good, highly saturated colors are of the highest importance
- Supported on 3 different Image Quality modes:
  - Backlit Speed:
    4 pass "Double Strike";
    Based on "General Production mode" Image Configuration;
    Sometimes some light banding can be observed, especially in dark color.

  - Backlit HighQuality:
    8 pass "Double Strike";
    Based on "General Photo mode" Image Configuration;
    Perfect Image reproductions, CMYK as well as RGB Images.

  - Backlit Max Saturation:
    8 pass "Double Strike";
    Based on currently released "Q8p_WideGamut" Image Configuration;
    Perfect reproduction of spotcolors, nice high saturated colors.

V. Wasatch SoftRip 6.5 "Black Point Compensation": WARNING !!!

As of April 21, Wasatch SoftRip 6.5 has a new rendering intent available:
Black Point Compensation (BPC).

Black Point Compensation addresses problems caused by differences in the darkest level of black achievable on one device and the darkest level achievable on others. It is a powerful tool for correction of problems with "dusty blacks", and a useful alternative to the ICC Perceptual and Colorimetric rendering intents.

1. An Industry Standard.

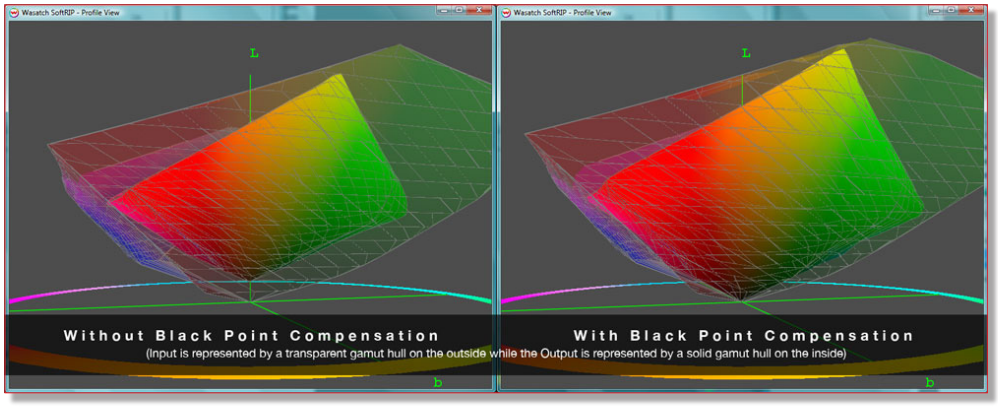
Popularized by its use in graphics applications, Black Point Compensation is a pre-standard variation of the ICC-defined Relative Colorimetric rendering intent and is under consideration for inclusion in the standard by ICC.

2. Color Rendering.

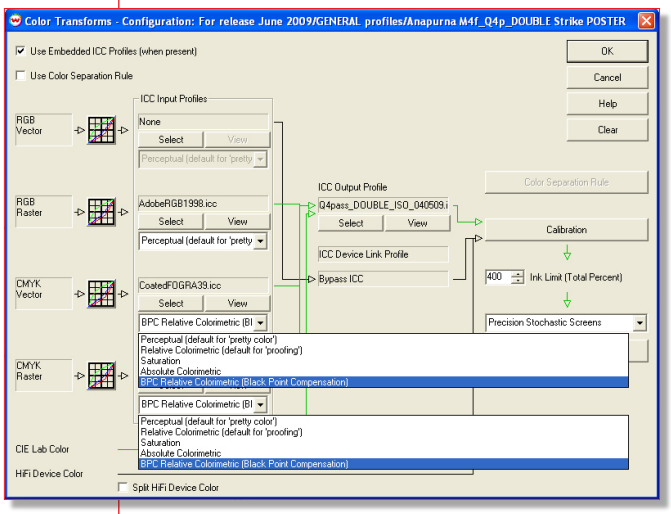
Black Point Compensation is included in SoftRIP as a new rendering intent and can be selected for use with existing ICC profiles. It will not invalidate ICC profiles in any way, but will only work in Wasatch systems that have a revision date of April 21, 2009 or later.

3. Easy to Use.

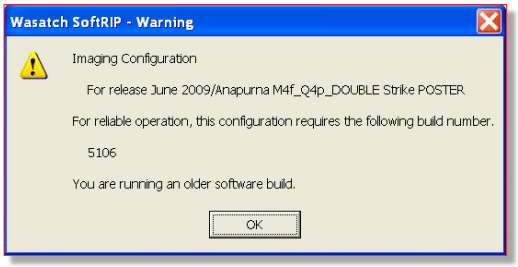
To use this new feature, simply select BPC Relative Colorimetric from the ICC Input Profiles section in the Color Transforms screen. This will automatically transform the gamut of your ICC profile to accommodate for the darkest black achievable on your device.



We already used this rendering intent on some Imaging Configurations (IC's) on the Anapurna M4f.



If your Wasatch SoftRip 6.5 Edition is older than April 21, and you select one of those Imaging Configurations with BPC, the above warning will pop-up.
If you click the OK-button, you can proceed further with the Imaging Configuration, as the BPC rendering intent is then automatically reset to "Perceptual", which is our other default.



If, at a later point, you decide to update the Wasatch SoftRip 6.5 to the version of April 21 or later... the IC's will then use the available BPC rendering intent automatically.