

Advanced VUTEk Linearization

EFI Fiery XF v4.1



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The Advanced VUTEk Linearization, first introduced in EFI Fiery XF v3.1.8, then improved in XF v4.0, is now heavily enhanced and available within EFI Fiery XF v4.1:

- New wizard for the creation of advanced linearization's for any VUTEk printer/ink/media combination
- Advantages
 - Improved ease-of-use
 - Unique custom black point definition
 - Automatically calculates and recommends various ink limits and linearization parameters
 - Utilizes the VUTEk printer gamut to its fullest!
 - Extensive summary screen & report

Advanced VUTEk Lin – Walk through

On the following pages I will describe the Advanced VUTEk Linearization process step by step. You will notice that the software automatically calculates and suggests many parameters to simplify your work, but you will also notice that some parts of the linearization need to be controlled manually.

That is mainly because ink thickness on UV printers and mottling / bleeding on e.g. textile materials need to be controlled with either the human eye, or sometimes even with a finger. In that way some of these checks cannot be automatically done with a spectrophotometer and require your attention.

Please select your EFI VUTEk printer as the output device in EFI Fiery XF's System Manager, right click on the output device and choose "Linearize Device". It will ask you to copy settings from the Output Device to the Linearization Device, please confirm this so that you will not have to set everything up in the "virtual" Linearization Device again.

Setting up the Advanced VUTEk Linearization

The screenshot shows the 'EFI Color Manager' window with the 'Linearize Printer' section selected in the left sidebar. The main area contains several settings sections:

- Measuring device settings:**
 - Measuring device: X-Rite i5is UVCut
 - ☐ Import Values
 - ☐ Linearization will be done automatically
 - ☐ Profiling will be done automatically
 - Linearization intent: ☐ Proof ☒ Photo/Production
- Printer settings:**
 - Printer: VUTEk GS-Series
 - Ink type: VUTEk GS
- Media settings:**
 - Media: AveryMPI3000
 - Media length correction: Target (mm): 500,00 Actual (mm): 500,00
- Output settings:**
 - Resolution: 600 x 360
 - Print mode: RTL Packbits
 - Color mode: CMYKcmyk, Advanced
 - Print direction: Unidirectional
 - Dot Size: [empty]
 - Halftoning: Error diffusion (SE1)
 - Screening: [empty]

At the bottom right are buttons for 'Advanced', 'Next', and 'Cancel'. On the left, a sidebar contains a list of settings: Settings, Physical Ink Limit, Ink Limit per Channel, Linearization, Black Point Definition, Advanced Ink Limit without light inks, Advanced Ink Limit with light inks, Quality Control, and Summary. Below this list is a text box with instructions:

Define the settings for your base linearization:

1. Connect your measuring device.
2. Select your measuring device from the drop-down list box, or select "Import values" to load previously saved measurement data, if required.

Note:
The "Settings" button is available for some measuring devices to make additional device-specific settings.

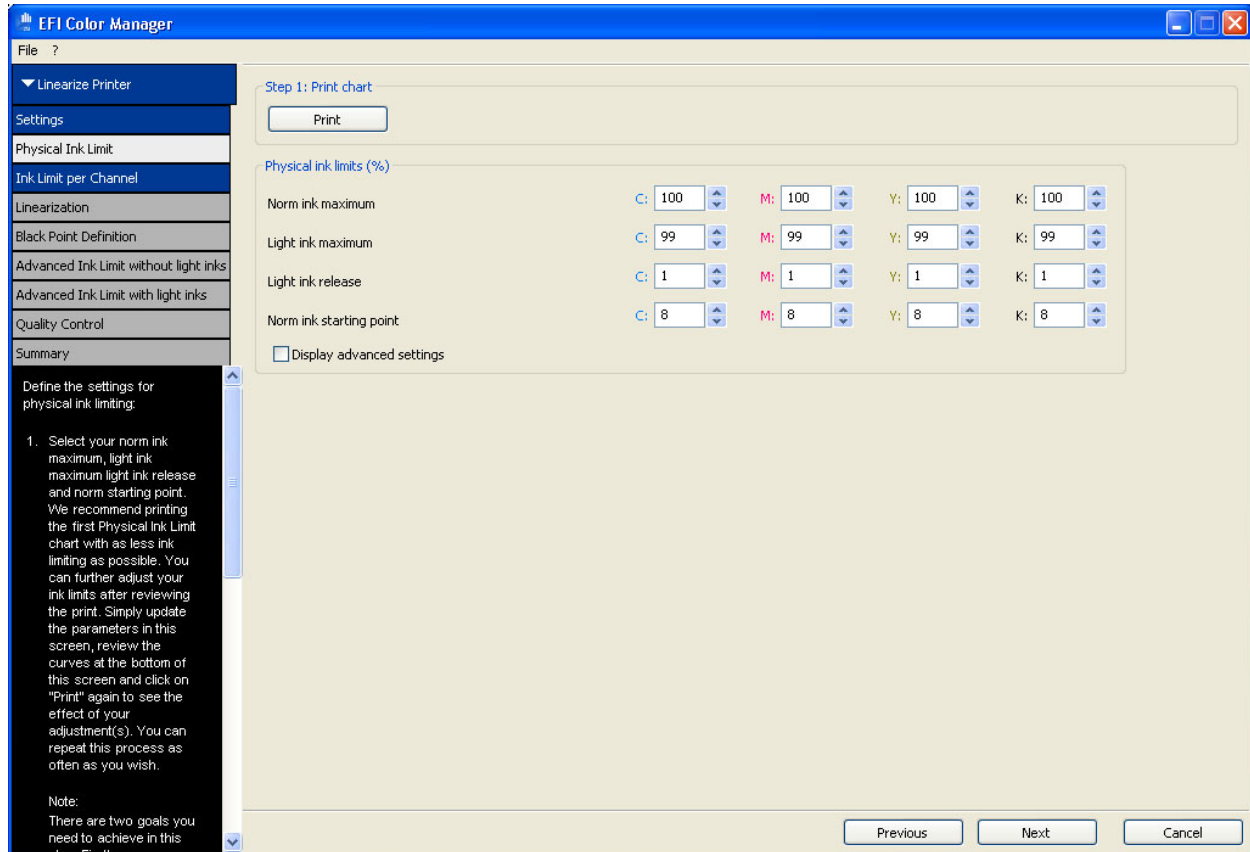
3. If your printer has an embedded measuring device, select the appropriate checkbox for automatic linearization and/or profiling, if required.

Select your measurement device, your ink type (some EFI VUTEk printers provide the possibility to use different ink types) and define a name for the media you are going to linearize.

Select the resolution, the Print Mode (RTL Packbits will compress RTL files, which is very handy if you have to deal with large RTL's), the Halftoning (SE1 for maximum quality, SE2 for higher production speeds – also note that currently only SE2 is being accelerated by NVIDIA graphic boards in EFI Fiery XF v4.1) and mostly important, the Color Mode.

The Color Mode will determine with how many colors you are working. If your EFI VUTEk printer is for instance set up to CMYKcmyk (4 norm inks and 4 light inks), then please select "CMYKcmyk, Advanced". The "Advanced" part in the name will enable what we call the "Advanced VUTEk Linearization". For VUTEk printers we highly recommend working with "Advanced" Color Modes exclusively.

Physical Ink Limit



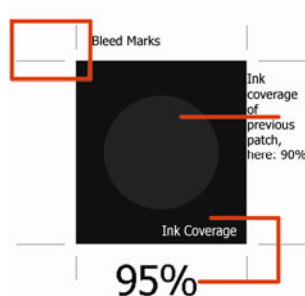
The next step, the Physical Ink Limit, will allow you to set up the basic ink limits for your EFI VUTEk printers.

If in doubt, please click "Print" to print the Physical Ink Limit chart with the default settings, or open any existing EPL from EFI that is installed along with EFI Fiery XF v4.1 or can be downloaded via the Online Profile Update. These pre-defined EPL's will be a great source of inspiration if you are trying to find the optimal values for your printer/ink/media combination.

- Norm Ink Maximum
 - Determines how much norm ink is going to be used in the process. Please note that there is an Ink Limit per Channel step later on, so only use values smaller than 100% if the media absolutely cannot handle it, and / or you see mottling, bleeding or are concerned about the ink thickness on the media.

- Light Ink Maximum
 - Determines the maximum amount of light ink used in the process. Use light ink to smooth out the screening. Do not be afraid to use a lot of light ink on UV printers. There's a special control (dynamic light ink slider) in a later step that will allow you to reduce light inks in areas where they are not really needed, so if ink consumption is your concern, then please do not overrate it in this step.
- Light Ink Release
 - The light ink release will allow you to control the way the light ink curves are being released into the norm ink curve. Click "Display Advanced Settings" to review the behaviour.
- Norm Ink Starting Point
 - Determines how quickly your norm ink is supposed to start and when it shall "take over" from the light inks. Please note that the norm ink starting point values are not absolute.

The following closer look at a single patch on the Physical Ink Limit chart explains how to read the patches in the gradation steps:

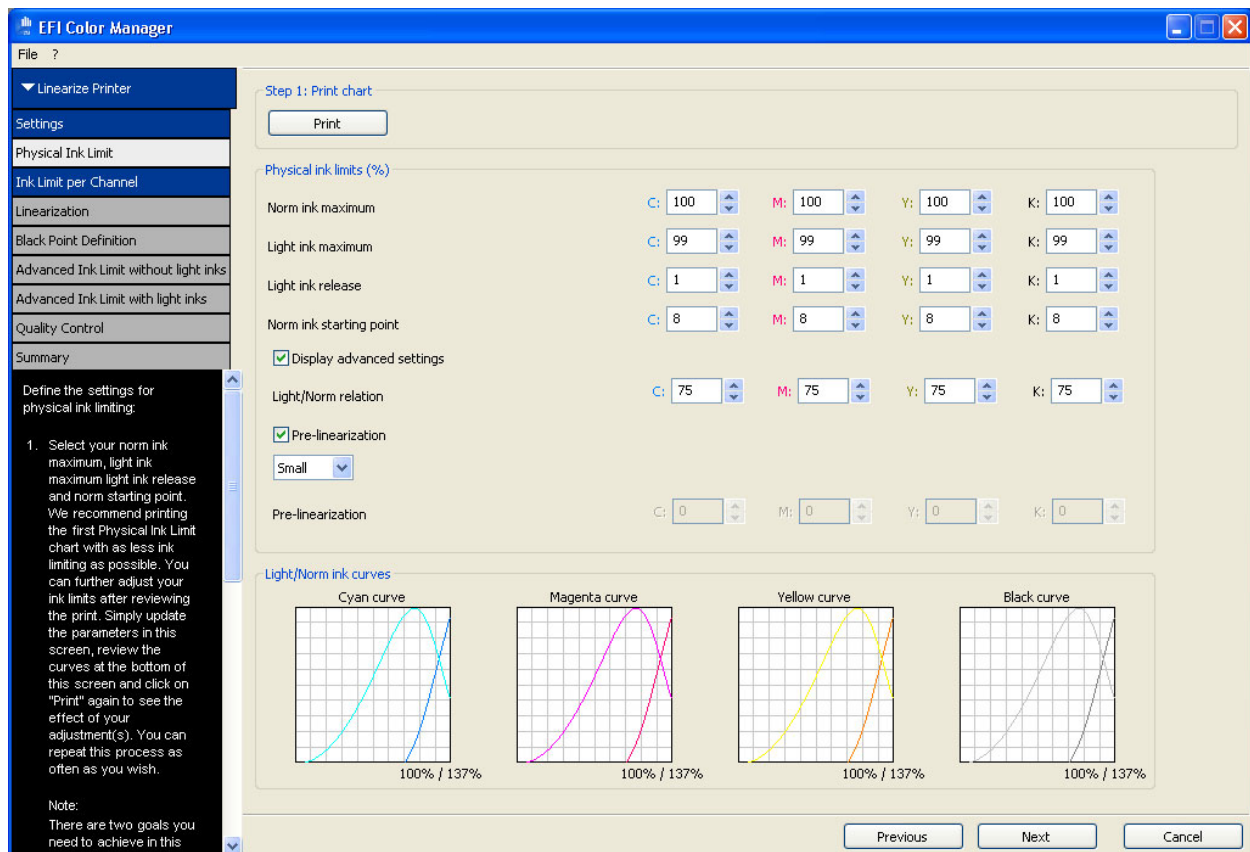


The "**Bleed Marks**" will help you to detect any bleeding. All patches are also surrounded by a fix 30% area of yellow/black to further detect any bleeding effects.

If, for example, a 95% patch has bleeding problems and a 90% patch is just fine, then limit the appropriate channel in the linearization tool to 90%. In addition, you will find circles within each gradation step. These circles contain the amount of ink from the previous gradation step, so a 95% gradation step contains a circle with the 90% value of the previous step. This helps you to evaluate whether the additional ink amount really is leading to a darker or more saturated color.

If you cannot see any circles in patches, e.g. at 80%, then this means that 75% ink and 80% ink is creating the same visual effect and in this case you might want to limit the channel to 75%. If in doubt, please do not limit the channel at all (unless you have bleeding/mottling effects) as there is still a Color Manager step in the linearization process that analyses all colors based on spectral measurements. So Color Manager has the possibility to find the best possible limit for your individual channels automatically. By manually limiting channels you always risk reducing the printer gamut, so please don't do it if it's not necessary.

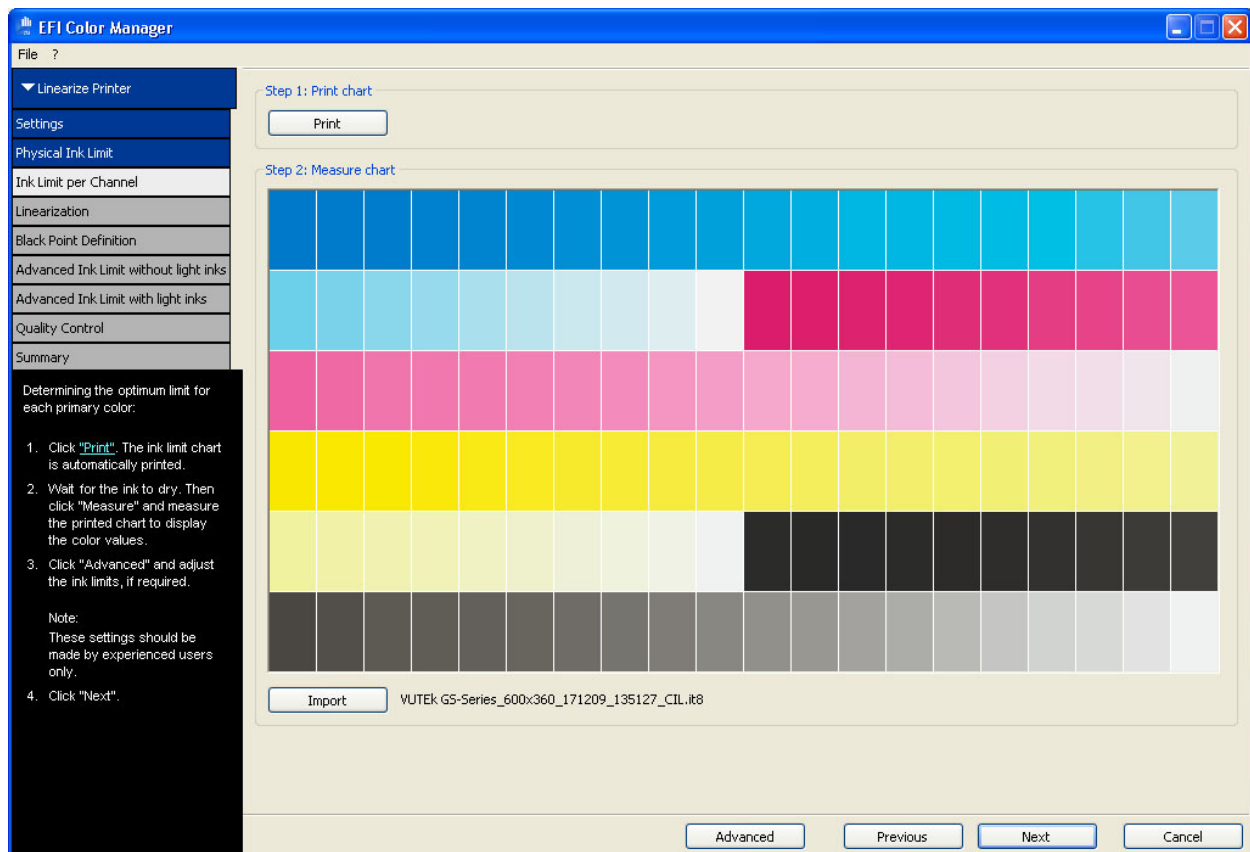
When you activate "Display Advanced Settings" you will gain access to an advanced user interface:



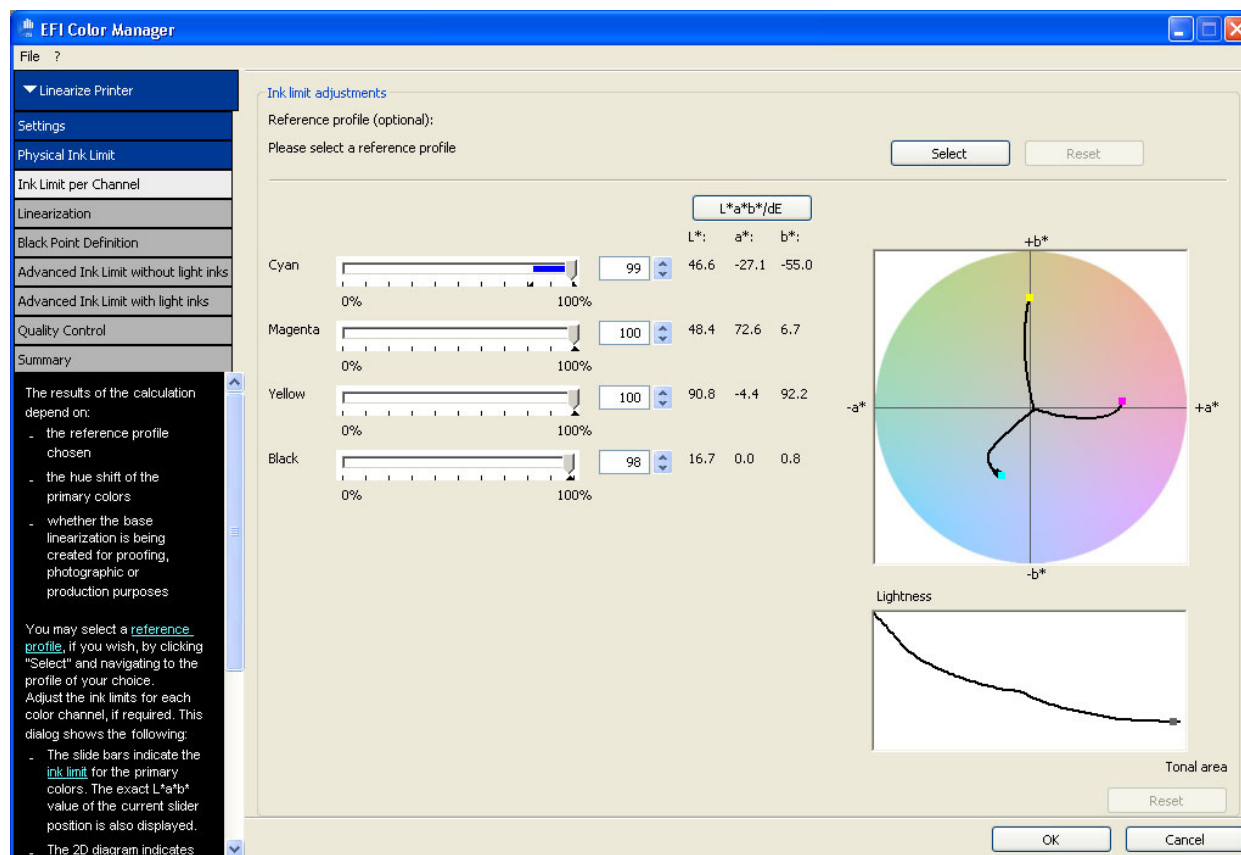
- Light/Norm relation
 - Defines the optical density relationship between light and norm ink. You can just regards this as a tool to shape the light and norm ink curves to your likings as well.
- Pre-linearization
 - Determines whether a pre-linearization shall be applied. EFI has set up defaults for each printer. Change these settings if you are not satisfied with the visual

appearance of the Physical Ink Limit chart, e.g. to get a smoother start for C, M, Y and/or K.

Ink Limit per Channel

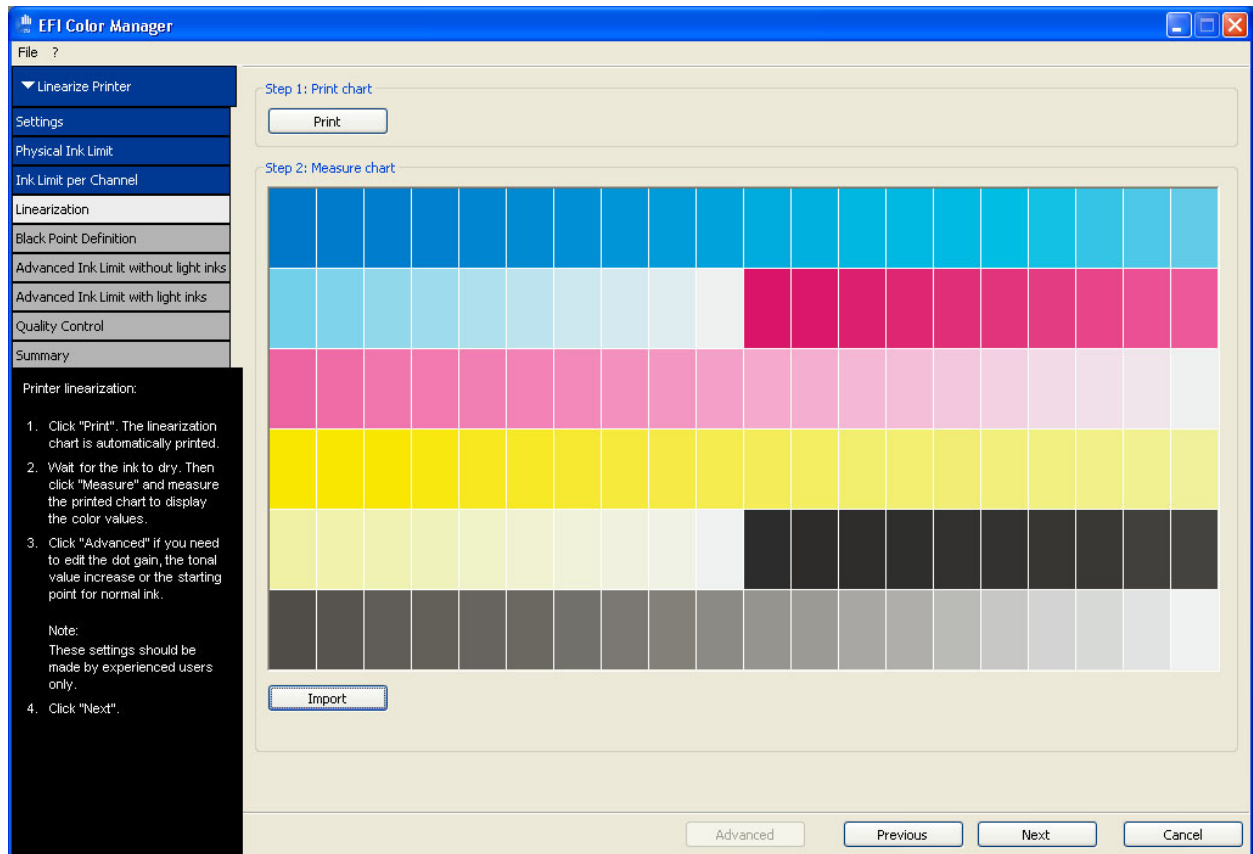


In the next step, the Ink Limit per Channel, EFI Fiery XF v4.1 will ask you to measure a chart. Please do so. The ink limits per channel will automatically be calculated and can be reviewed when you click on "Advanced". The difference to the Physical Ink Limit step is that here the ink limiting is not any longer based on physical effects (mottling, bleeding, ink thickness), but rather based on colorimetric (lightness, saturation, etc.) effects that can be determined with a spectrophotometer.



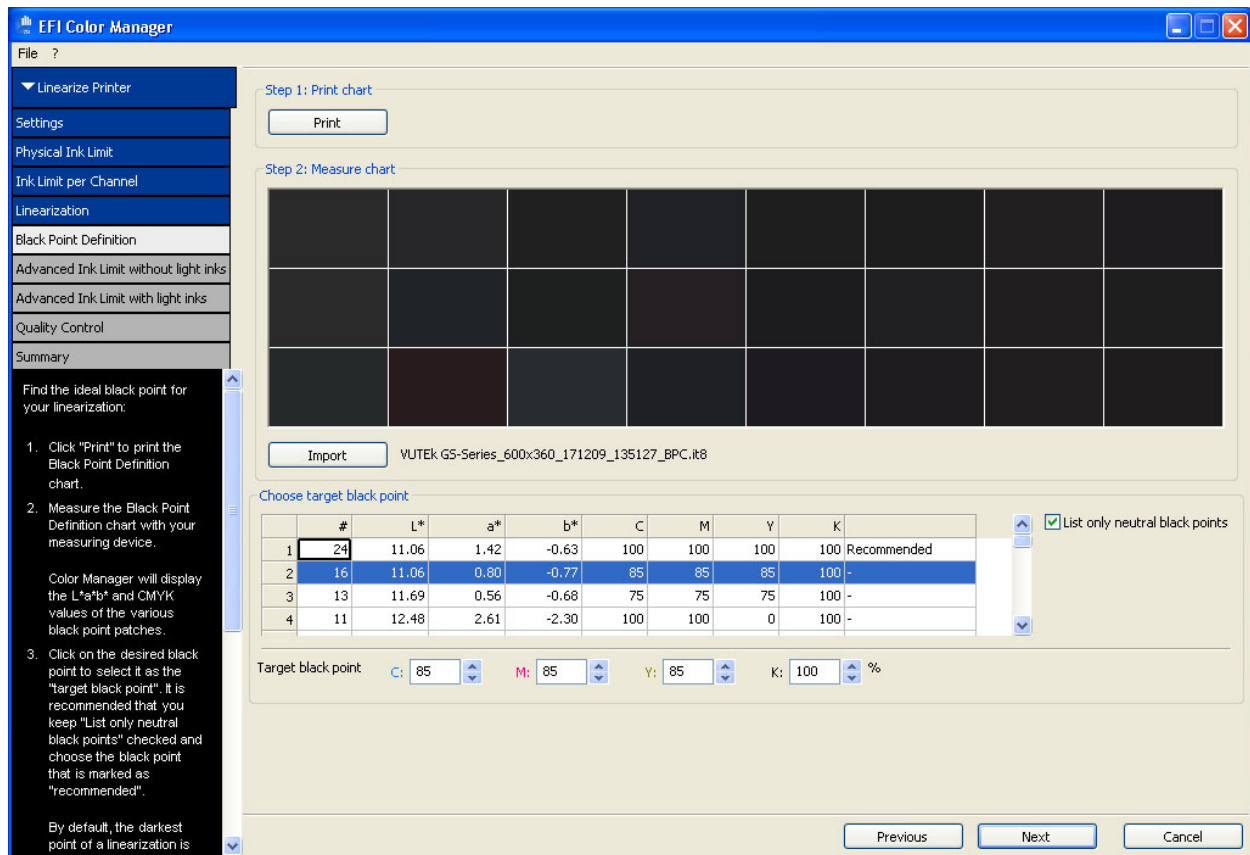
The "Advanced" button allows you to review the ink limits EFI Fiery XF v4.1 has chosen for you. Please consult the EFI Fiery XF v4.1 documentation to get detailed information and hints about this step.

Linearization



The linearization step again requires you to print and measure a chart. No further user interaction is needed. EFI Fiery XF v4.1 will automatically calculate the linearization curves for each channel.

Black Point Definition



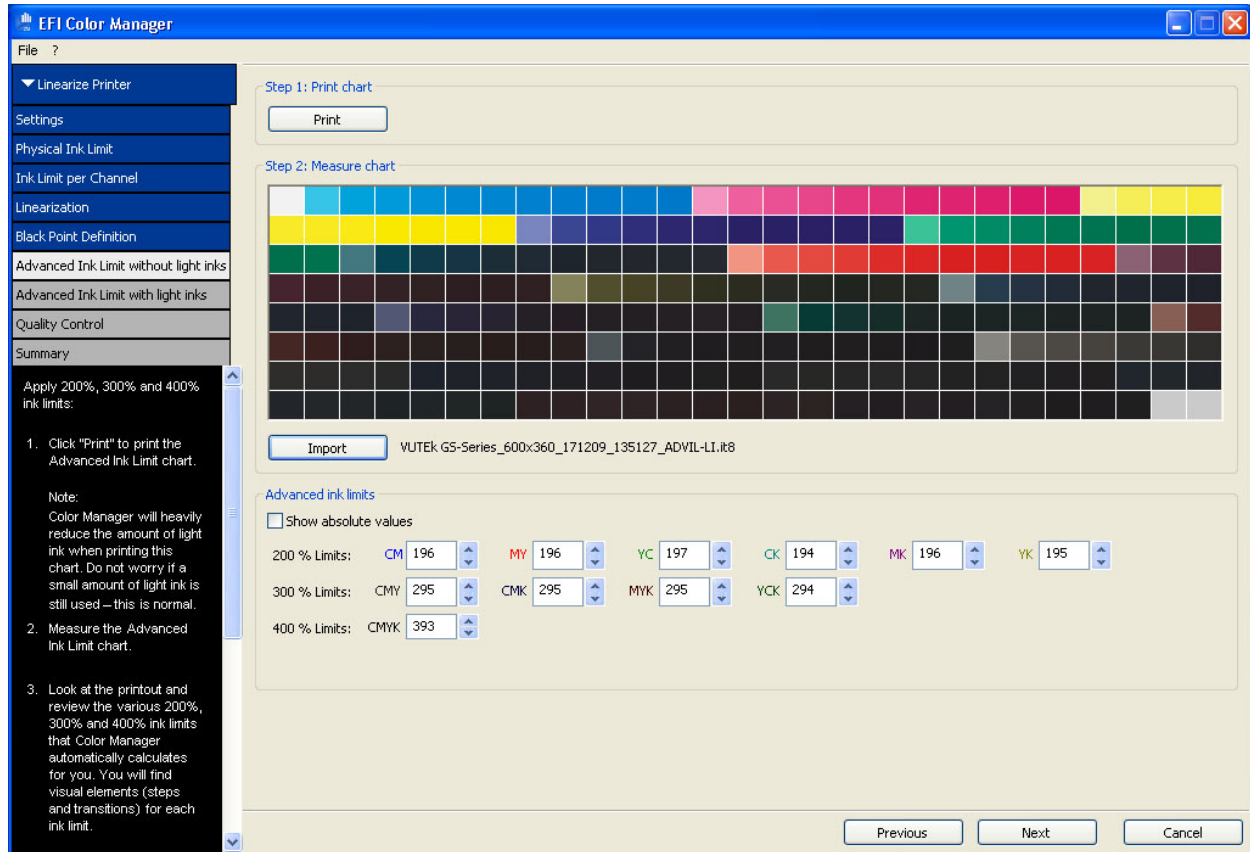
The Black Point Definition step is a new development in EFI Fiery XF v4.1 and very important. After printing and measuring the Black Point Definition chart, EFI Fiery XF v4.1 will suggest a target black point. The recommended selection is purely based on colorimetric measurements and will also automatically recommend black points that do not lead to any reversing effect what so ever.

Now you should review the recommended black point on the printed chart. If EFI Fiery XF v4.1 for instance recommends patch 24, then check this patch visually to find any bleeding/mottling or check the ink thickness and the visual appearance. If you would rather like to use a different patch as the target black point, then feel free to change the recommendation.

This target black point will determine the darkest color that the printer will be able to reproduce later on.

Please do not mix up this step with a total ink limit. It is technically possible to use a target black point of CMYK 0 0 0 100 and still set up a total ink limit of e.g. 350% later on. The Black Point Definition will help you to get the most of out of the dark printed areas of your EFI VUTEk printer.

Advanced Ink Limit without Light Inks



In the next step, the Advanced Ink Limit chart can be printed (it will be outputted with heavily reduced light inks in this step, don't get confused about this) and measured. The measurable part of this chart contains various patches that lets EFI Fiery XF v4.1 determine the 200%, 300% and 400% ink limits for the linearization. This ink limiting process is done intelligently and EFI Fiery XF v4.1 is focussing on avoiding any potential reversing problem.

We still do recommend to review the calculated ink limits on the visual components of the Advanced Ink Limit chart in regards to mottling, bleeding and/or ink thickness.

Please note that you can modify the calculated ink limits freely. If you have done so, just click on "Print" again to evaluate the result on the printed chart. Don't be surprised if all ink limits are then suddenly "reset", that is normal. The reason is that all ink limits are then displayed "relatively". This allows you to do further adjustments based on the visual components of the Advanced Ink Limit Chart. If you set e.g. one of the a 200% ink limits to 160% and then print the chart, then the position marked as "200%" is actually printed with 160%. If you now want to work with an ink limit

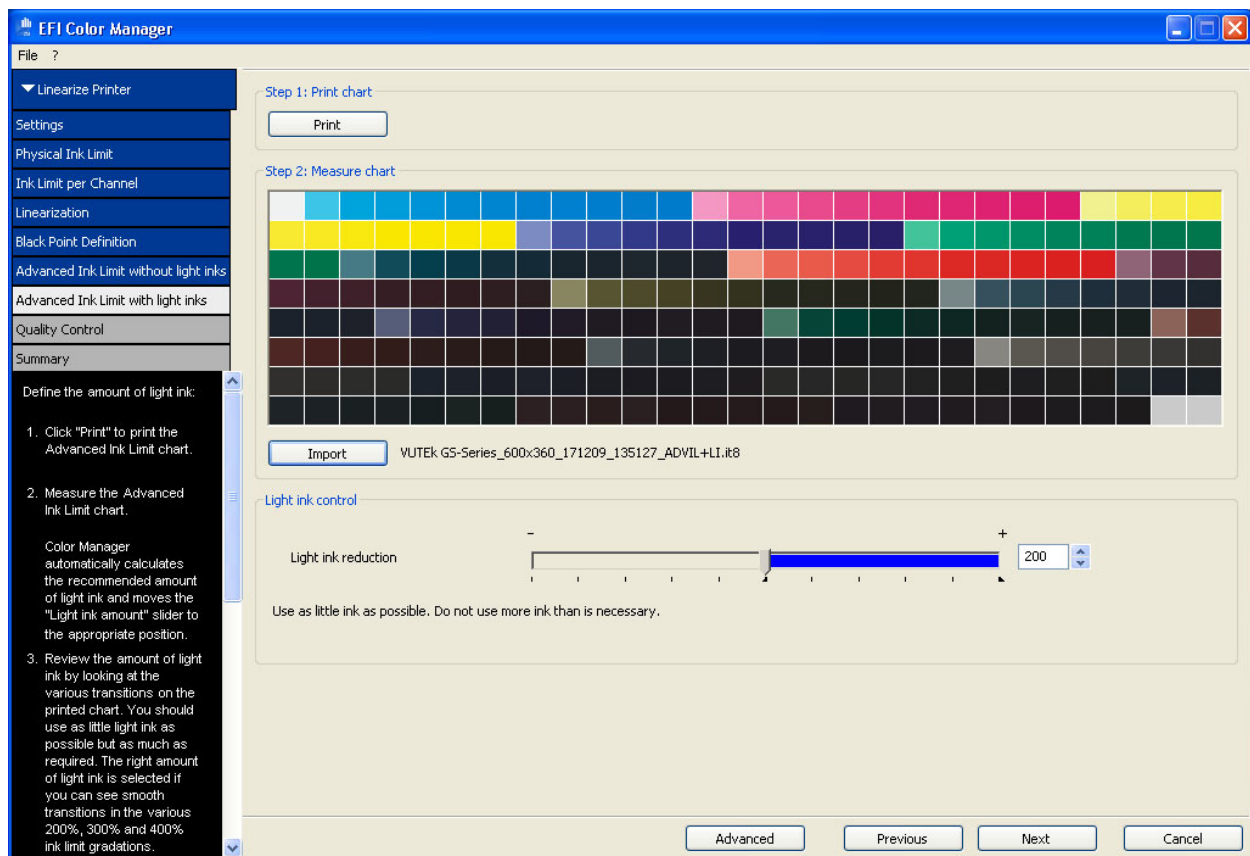
of 190% on the printed chart, then you can just enter that value of 190% into the user interface and EFI Fiery XF v4.1 will automatically calculate the “correct” value.

“Correct”, because if you set a 200% ink limit to 160%, print and then define an ink limit of 190%, then in reality you defined an ink limit of 152% ($160 / 200 * 190 = 152$).

We don't want you do calculate that, hence EFI Fiery XF v4.1 does that for you.

Advanced users can just click on “Show absolute values” to review the absolute ink limit percentages that will be taken for the linearization (that would be 152% in the above case).

Advanced Ink Limit with Light Inks

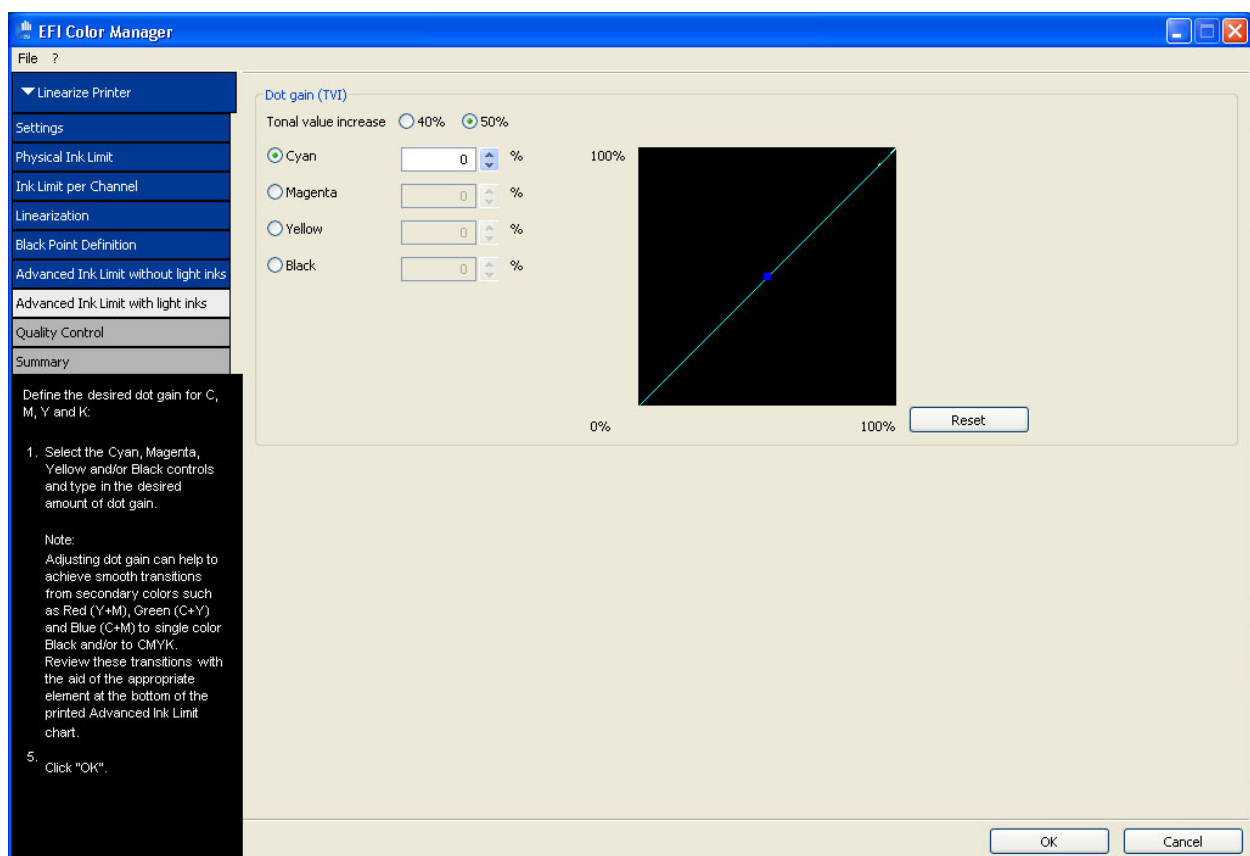


After the various 200%, 300% and 400% ink limits have been set up, the Advanced Ink Limit chart is printed, now with full light inks. A new “light ink reduction” slider will become available. This slider plays a very important role in your linearization. EFI XF v4.1 will automatically calculate the

recommended slider position. We already defined the relation of norm to light ink in the Physical Ink Limit. But with this slider we can control the amount of light ink that will be used in 200%, 300% and 400% colors. This is a very powerful tool to reduce the ink amount and/or the ink thickness.

The further you move the slider position to the right, the less light ink will be used (or the higher the light ink reduction). The further you move the slider position to the left, the more light ink will be used (or the less light ink reduction will occur).

Please check the various color transitions of your 200%, 300% and 400% ink limits on the Advanced Ink Limit chart. If you find grainy transitions, you might want to decrease the amount of light ink reduction. If you find overinked areas where too much light ink is leading to e.g. bleeding, then increase the light ink reduction.



If you click on "Advanced", then you will be able to define the amount of dot gain that you want to apply to Cyan, Magenta, Yellow and/or Black. There are visual elements on the Advanced Ink Limit chart that help you to determine whether an appropriate amount of dot gain has been chosen:

Achieving the optimal dot gain setting

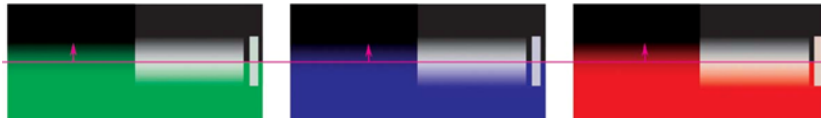
Elements 1, 2 and 3 of the chart at the bottom of the Advanced Ink Limit Chart can be used to evaluate your dot gain setting in a visual way:



Dot gain set up perfectly

The left transition from top to bottom needs to run smoothly from CMYK to red / green / blue. The turn around point of the transition should be around the horizontal red line. For the right transition from black to red / green / blue on the other hand there needs to be a slightly brighter band in the middle of the transition. If the print looks like the above screenshot, then your dot gain is set up perfectly.

If your dot gain is too low, then the elements will look like this:



Dot gain too low

On the left side the transition lost details and is starting too early, the transition is mainly happening above the red line. The bright band on the right side is way too bright.

If your dot gain is too high, then the elements will look like this:



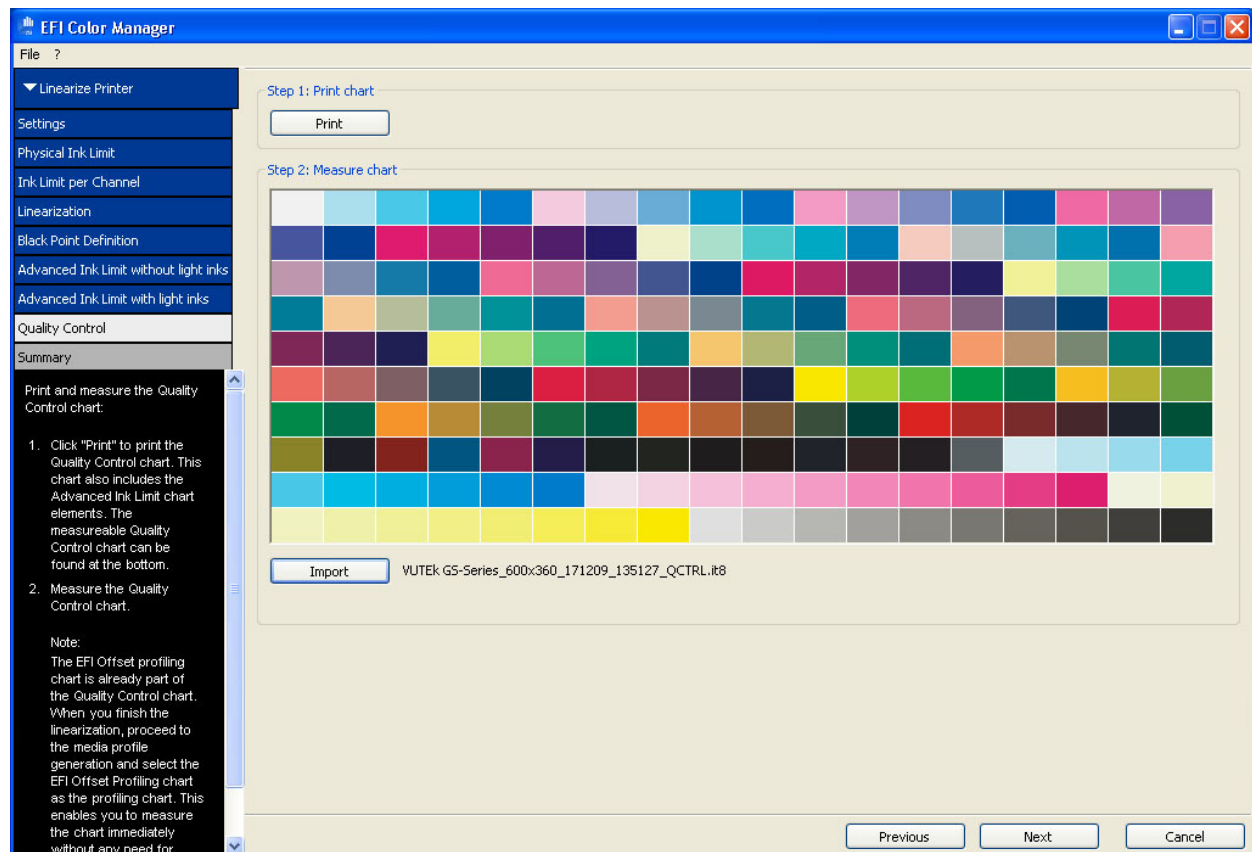
Dot gain too high

On the left side the transition to red / green/ blue is starting too late, it's below the red line. The bright band on the right side is not around the red line, but you'll rather see reversing effects in the upper part of the right transition from black to red / green / blue.

If the green transition is problematic, adjust the dot gain for Cyan and Yellow. If the blue transition is problematic, adjust the dot gain for Cyan and Magenta. If the red transition is problematic,

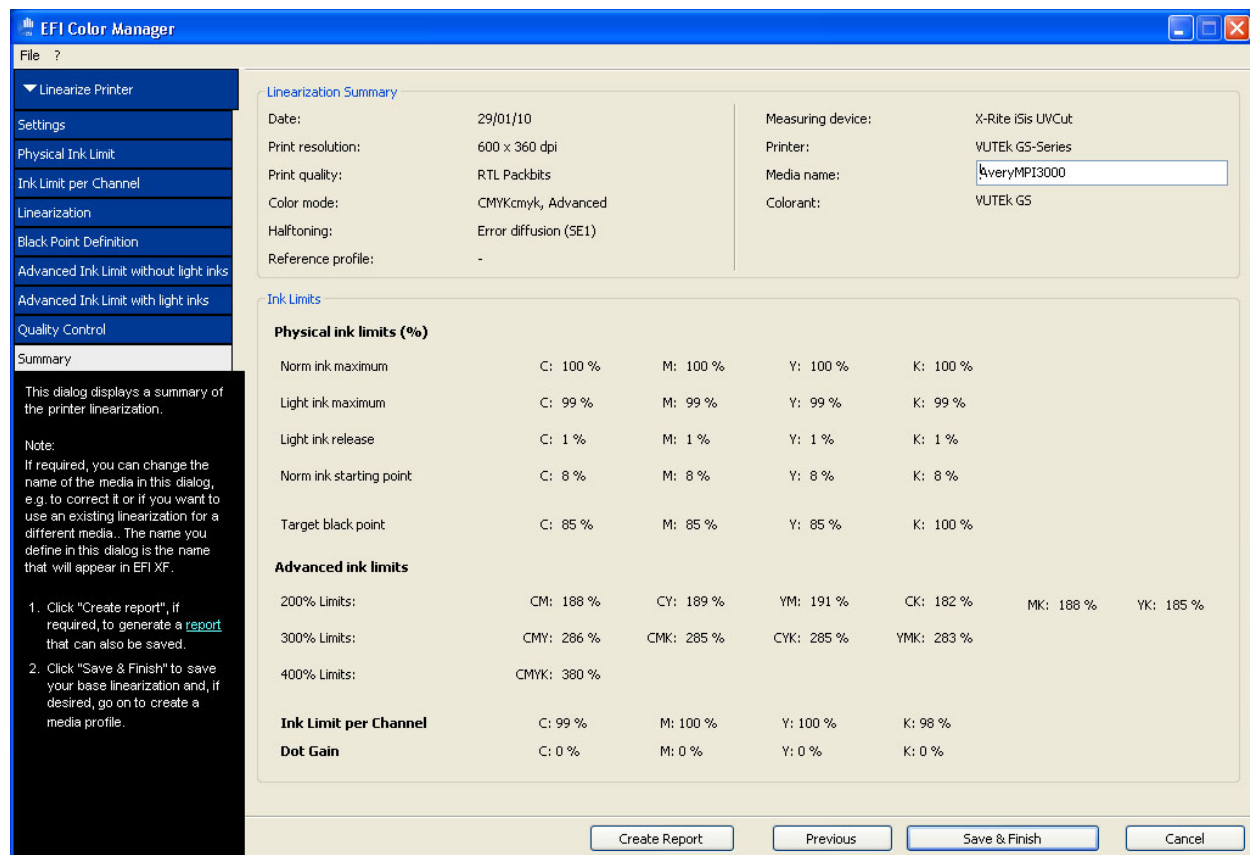
adjust the dot gain for Magenta and Yellow. Adjust the dot gain for black depending on whether the turning point of the transition is above the red line (increase the dot gain) or below the red line (decrease the dot gain).

Quality Control



Next we are printing and measuring the Quality Control Chart. This is not a crucial step for your linearization itself, but it is crucial for the documentation of the linearization you just created. Click "Next" after you measured the chart to see the Summary for your specific linearization:

Summary



EFI Color Manager

File ?

▼ Linearize Printer

Settings

Physical Ink Limit

Ink Limit per Channel

Linearization

Black Point Definition

Advanced Ink Limit without light inks

Advanced Ink Limit with light inks

Quality Control

Summary

This dialog displays a summary of the printer linearization.

Note:

If required, you can change the name of the media in this dialog, e.g. to correct it or if you want to use an existing linearization for a different media. The name you define in this dialog is the name that will appear in EFI XF.

1. Click "Create report", if required, to generate a [report](#) that can also be saved.
2. Click "Save & Finish" to save your base linearization and, if desired, go on to create a media profile.

Linearization Summary

Date: 29/01/10

Print resolution: 600 x 360 dpi

Print quality: RTL Packbits

Color mode: CMYKcmyk, Advanced

Halftoning: Error diffusion (SE1)

Reference profile: -

Measuring device: X-Rite iSis UVCut

Printer: VUTEK GS-Series

Media name: EveryMPI3000

Colorant: VUTEK GS

Ink Limits

Physical ink limits (%)

Norm ink maximum	C: 100 %	M: 100 %	Y: 100 %	K: 100 %
Light ink maximum	C: 99 %	M: 99 %	Y: 99 %	K: 99 %
Light ink release	C: 1 %	M: 1 %	Y: 1 %	K: 1 %
Norm ink starting point	C: 8 %	M: 8 %	Y: 8 %	K: 8 %
Target black point	C: 85 %	M: 85 %	Y: 85 %	K: 100 %

Advanced ink limits

200% Limits:	CM: 188 %	CY: 189 %	YM: 191 %	CK: 182 %	MK: 188 %	YK: 185 %
300% Limits:	CMY: 286 %	CMK: 285 %	CYK: 285 %	YMK: 283 %		
400% Limits:	CMYK: 380 %					

Ink Limit per Channel

C: 99 %	M: 100 %	Y: 100 %	K: 98 %
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Dot Gain

C: 0 %	M: 0 %	Y: 0 %	K: 0 %
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Create Report Previous Save & Finish Cancel

Here you will be able to review all the various ink limits EFI Fiery XF v4.1 has calculated for you / that have been modified by you for your specific printer/ink/media combination.

You can also click on "Create Report" to generate a VUTEK linearization-specific JPEG report that is excellent for archiving the details about your linearization.

Finally you may click on "Save & Finish" to save your linearization in an EPL file.

EFI Fiery XF v4.1 will ask you whether you want to continue with a profile generation, which will lead you through the easy process of creating an individual ICC profile.