Making QTR Profiles with a

Flatbed Scanner

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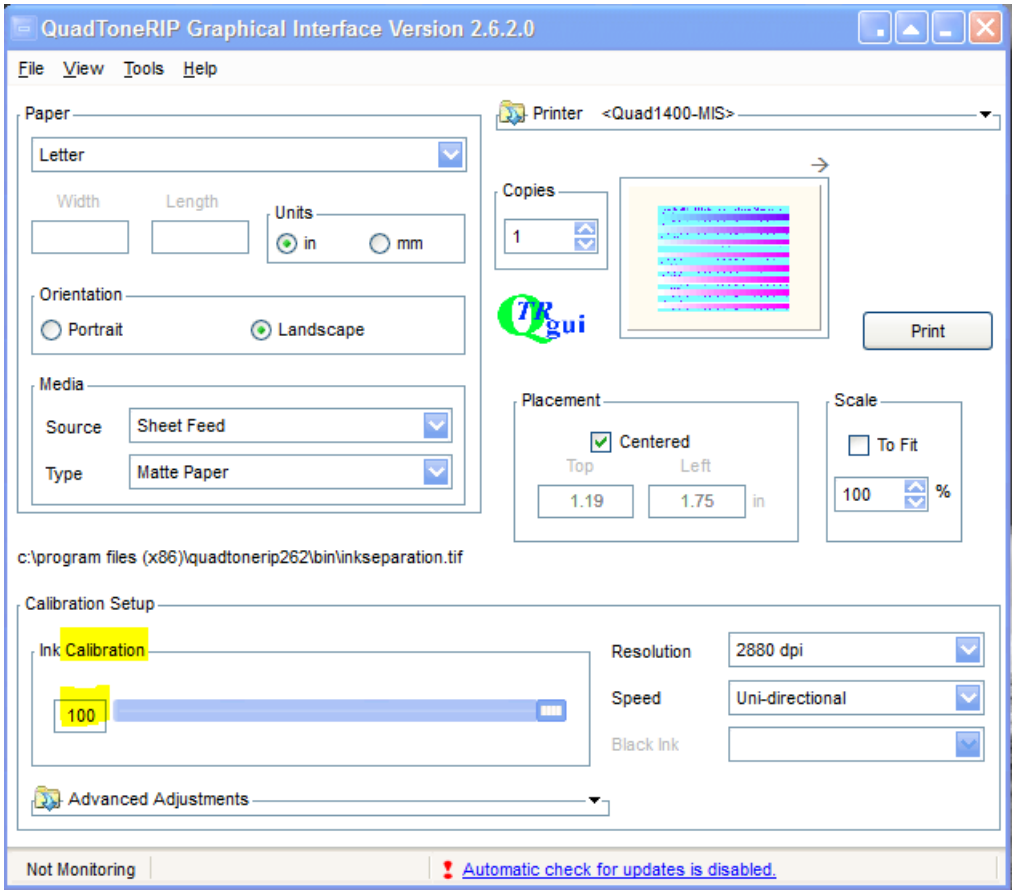
This PDF looks at an easy, simplified method of making QTR profiles where a flatbed scanner is used as the method to read the relative densities/luminances (Lab L) of the test strips.

A Windows 7 computer, Epson 1400 printer, Eboni-6 inkset (http://www.paulroark.com/BW-Info/Eboni-6.pdf), and Epson Perfection V33 flatbed scanner are used here. The test paper was Red River Polar Matte. The resulting profile is in http://www.paulroark.com/BW-Info/1400-Eb6-Profiles.zip.

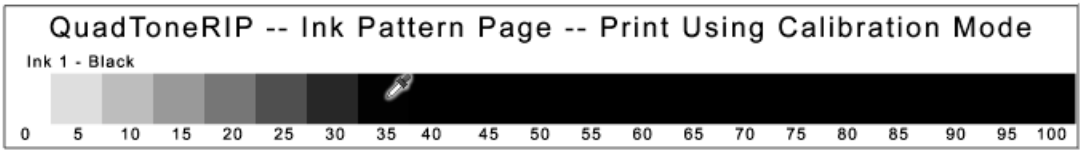
1. Find the Black (K) Ink Limit; Use it as the Default Ink Limit

The first step is to print a black-only 21-step test strip with QTR where the ink limit is 100%. The easiest way for most to do this is to print a Calibration Mode test print with QTR. (In the QTR Windows GUI, click on Tools > Options > Calibration Mode.) Set the Ink Calibration to 100. The other settings, like Media Type, Resolution, and Speed are things I leave as shown for all my work.



After this print is dry (overnight is best, but I use a hair drier for speed), scan the Black (top) test strip. I recommend this be placed vertically in the scanner bed so that the same part of the scanner is used for the entire test strip. The black test strip is all that is used from this first Calibration Mode print.[1]

In Photoshop or other similar image editor, open the scanned image and read the test strip patches with the Eyedropper tool. Using an Eyedropper size of 5 pixels is probably sufficient to average out minor variances. (Only the top portion of the Calibration Mode print is shown here.)

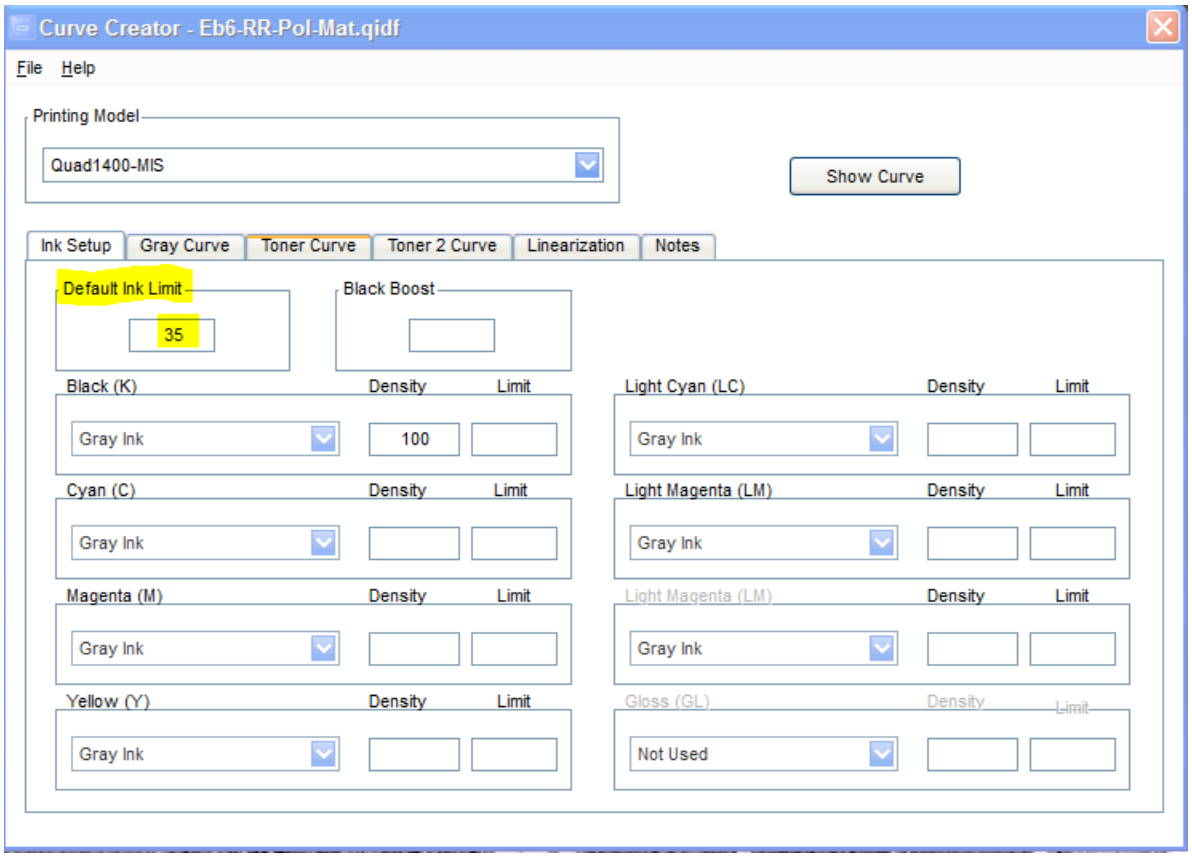


The patch where the test strip no longer gets darker is the ink limit. Here, that is 35. Note that after the print reaches its limit it will be about the same, bouncing around for a while. Use "left edge" of this density plateau.

The "ink limit" settings for the other inks also need to be determined. However, unlike the black ink, where to set these is almost never at the most dense point for the lighter inks. The quality of images these inks print will usually decrease well before they reach their ultimate ink limits, where they no longer are getting darker. As such, the ideal "ink limit" setting is more subjective and less critical. I have found that almost always the ultimate ink limits of the other, lighter inks are higher than that for the black ink. Thus, the easy thing to do is to use the same ink limit for all inks. Therefore, to make things easy, set the Black ink limit as the "Default" ink limit and allow it to be used by all the ink by leaving the "ink limit" boxes for the other inks blank. I have found that this almost always makes a good profile. Even if it may not be the best for all purposes, it is a good place to start if one is just learning. It works.

In Windows, the Curve Creator is used to make or modify QTR profiles. (In the Windows QTR GUI, click on Tools > Curve Creation.) A screen grab is shown below.

[1] I actually print a 21-step test strip, e.g, http://www.paulroark.com/BW-Info/21-step.jpg (save as a Tiff), with a profile I call "K-0-100." This is in http://www.paulroark.com/BW-Info/1400-Eb6-Profiles.zip . This is faster and uses less paper than printing an entire Calibration Mode print.

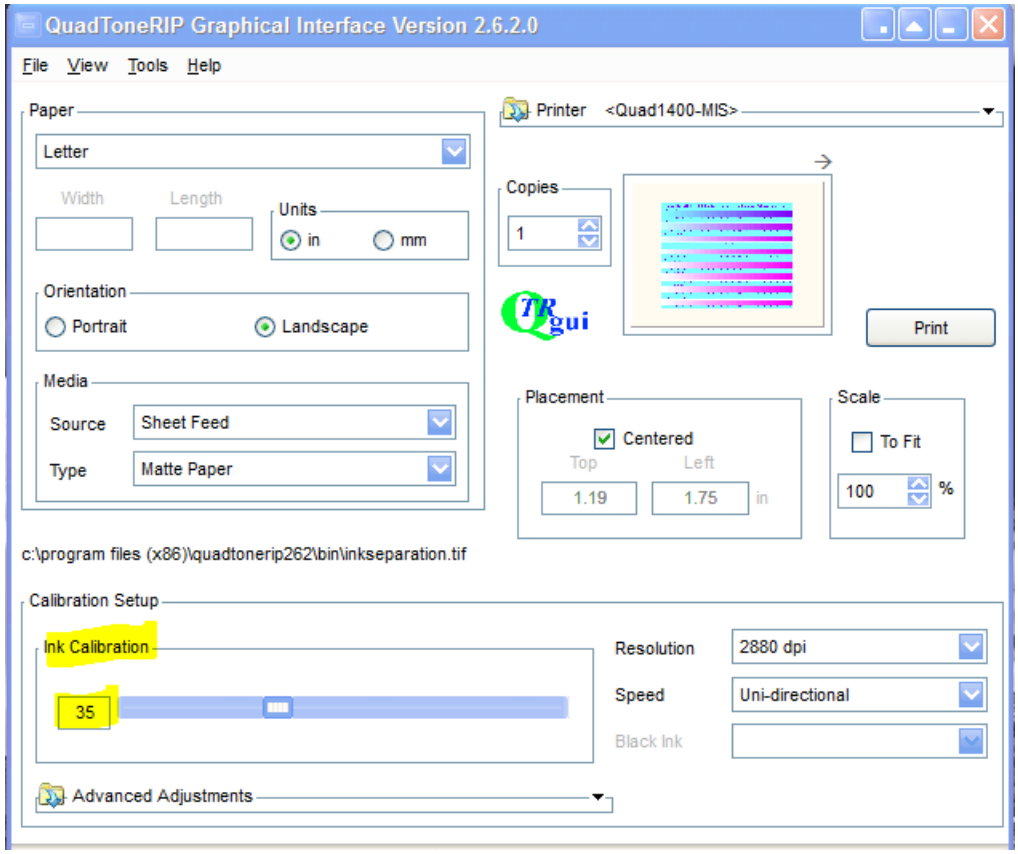


In the Ink Setup tab of the Curve Creator, the black ink limit determined above is set as the Default Ink Limit and will be used for all of the inks in this example.

Note that since this inkset is a monotone inkset, all of the inks are set as “Gray” inks. (There are 6 inks. The last 2 boxes are not active for this printer.)

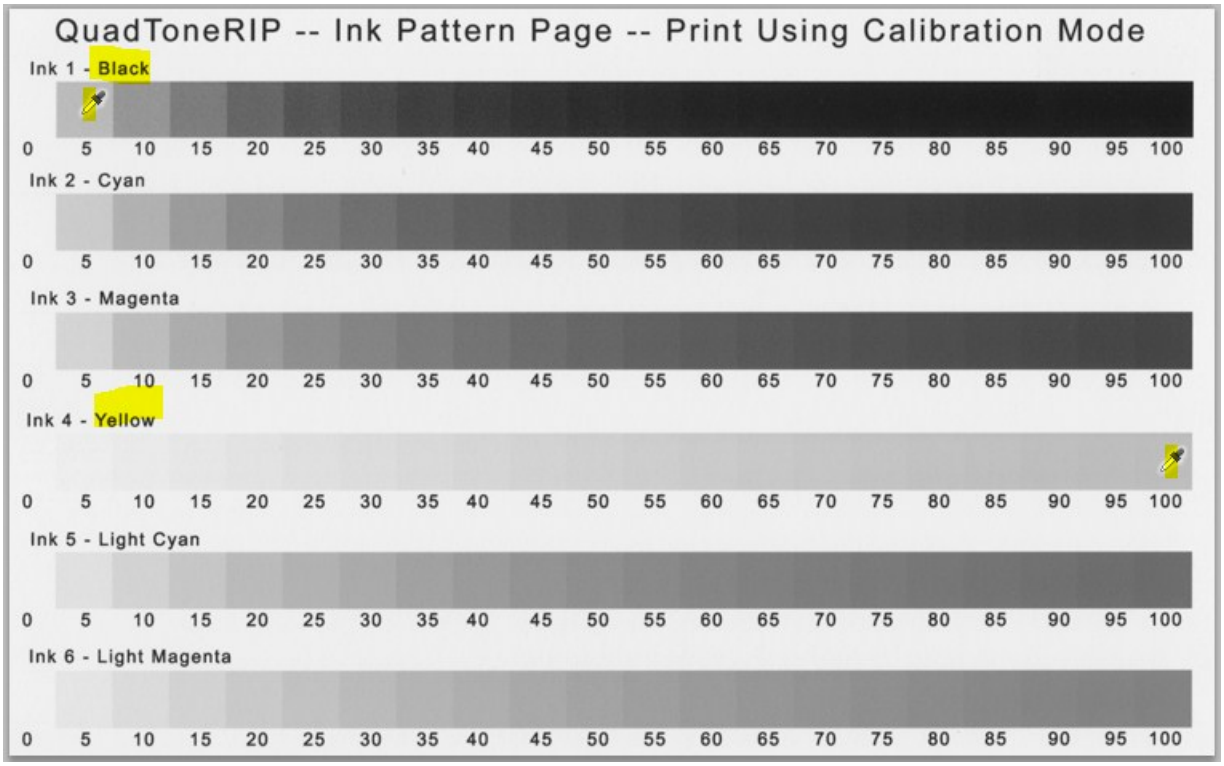
2. Determine the "Densities" of the Inks

The "Densities" that are needed to make a QTR profile are the relative print densities of the lighter inks at their "ink limits" compared to the black ink when it is printed at its ink limit. To find these relative densities, print a second Calibration Mode test print at the ink limit determined above. Here that would be 35.



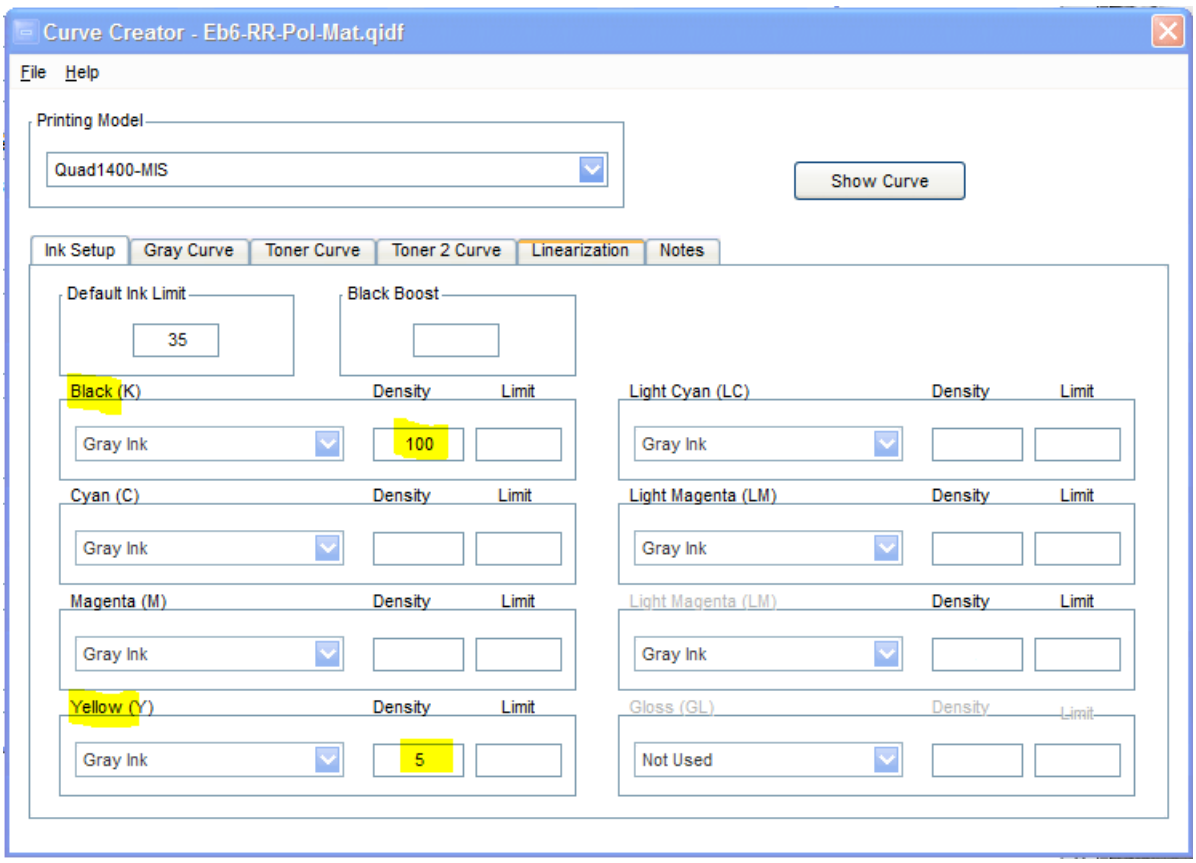
When this print is totally dry, scan the entire print. Be sure the scanner is not clipping the ends of the histogram. Open the image in Photoshop or similar image editor.

For each light ink, using the Photoshop Eyedropper tool, read the density of the light ink 100% patch and determine which patch on the Black ink test strip (interpolating where necessary) matches the density of the 100% patch of the light ink. This determines the "Density" of the lighter ink.

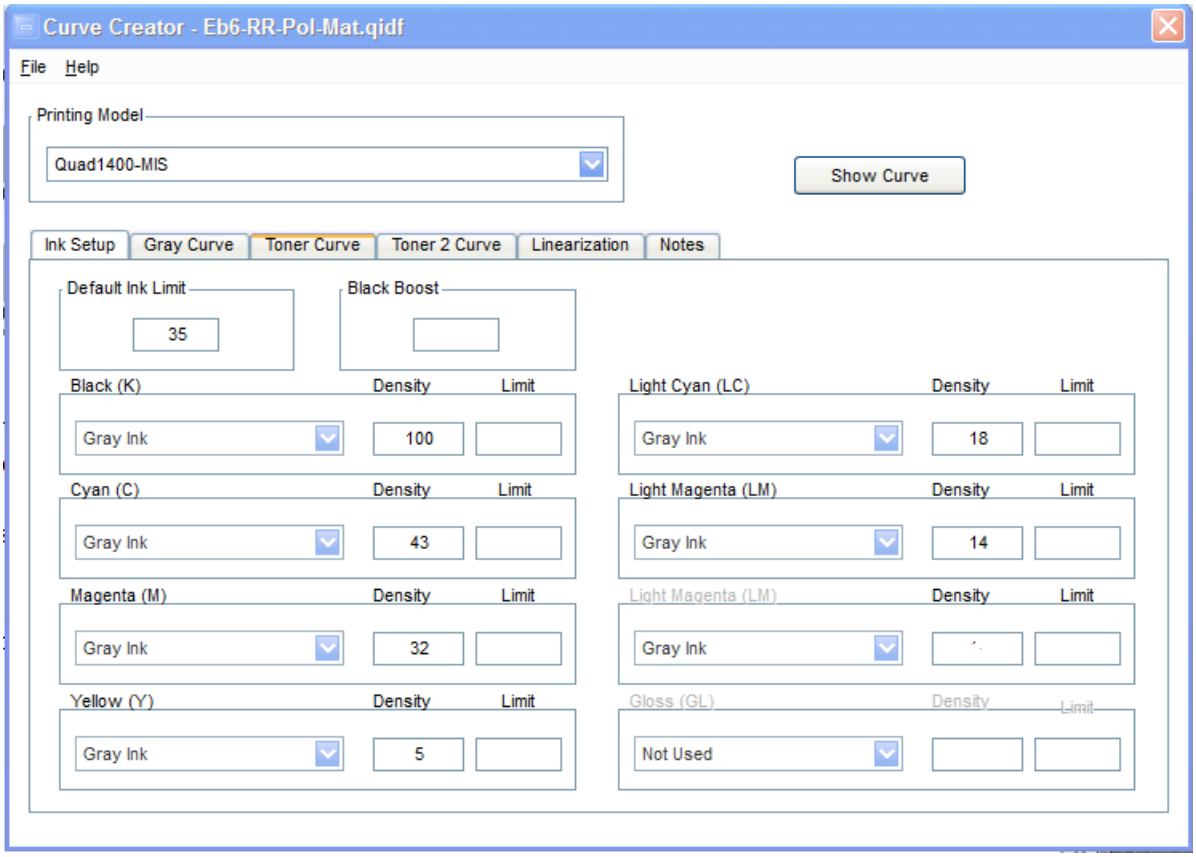


In the example above, the “yellow” (lightest Eboni-6 ink) at 100% (when printed at its ink limit of 35) has the same density as the Black ink at 5% (when printed at its ink limit of 35). Thus in the Curve Creator the Density for the Yellow-position ink is 5.

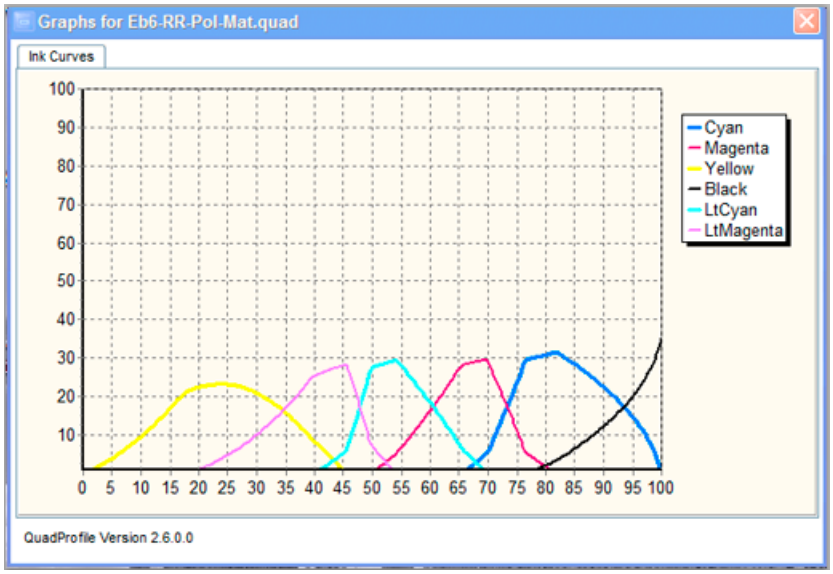
Note that the Black ink density is always 100. See the screen grab below.


Curve Creator - Eb6-RR-Pol-Mat.qidf
File
Help
Printing Model
Quad1400-MIS
Show Curve
Ink Setup
Gray Curve
Toner Curve
Toner 2 Curve
Linearization
Notes
Default Ink Limit
35
Black Boost
Black (K)
Density
Limit
Gray Ink
100
Light Cyan (LC)
Gray Ink
Cyan (C)
Gray Ink
Light Magenta (LM)
Gray Ink
Magenta (M)
Gray Ink
Light Magenta (LM)
Gray Ink
Yellow (Y)
Gray Ink
5
Gloss (GL)
Not Used

This same process is used for all the light inks. The final Curve Creator Ink Setup for the Red River Polar Matte paper used in this example is shown below.

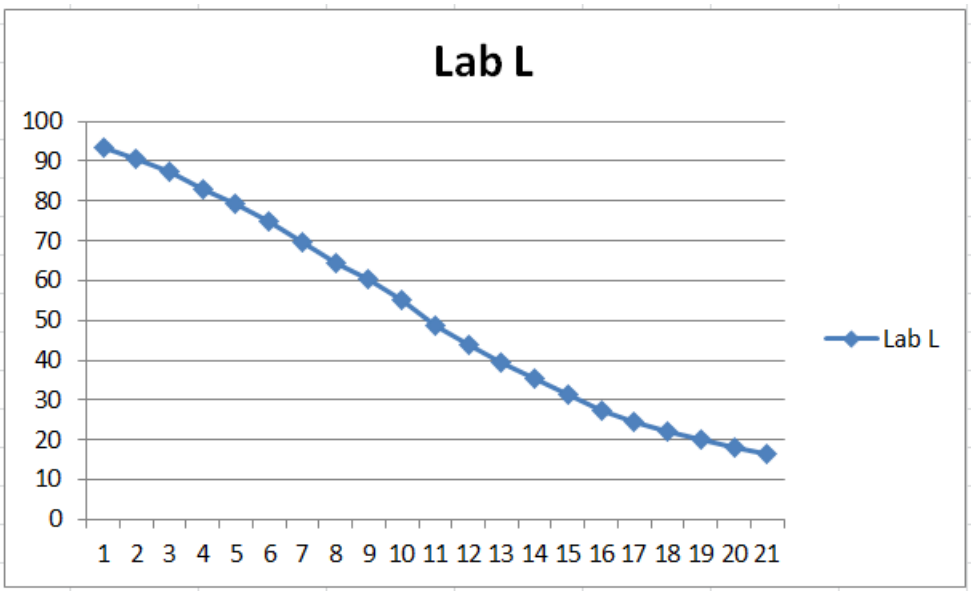


At this point, press the "Show Curve" button and save the file. This generates the "*.quad" file that is actually used in printing and also shows you the partitioning of the inks.

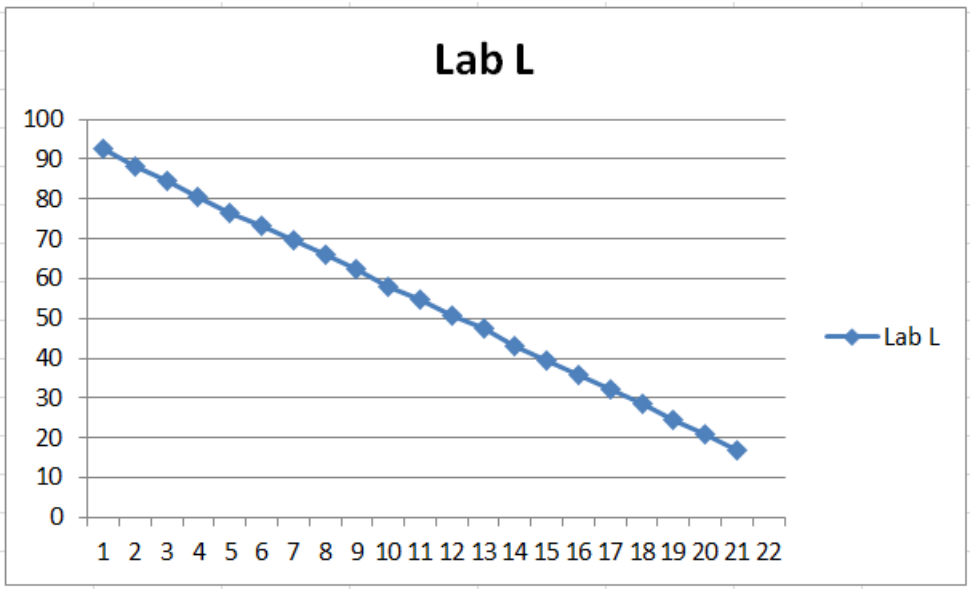


3. Linearize the Profile

The final step is to "linearize" the profile. The initial characteristic curve (file input value to print Lab L value) is virtually always less than ideal. Here, the graph below (Excel Line Chart) shows the curve for the pre-linearized profile.



The graph below shows the same profile input to output relationship after linearization.



The process of linearization with a flatbed scanner involves comparing the pre-linearization 21-step test strip with a test strip of known values. The Tiffen or Kodak Q-13 "Color Separation Guide (small)" test strip is used for this. These are available from larger photo stores, including B&H via mail order.

The process of using a flatbed scanner to read a test strip for linearization purposes has been automated by Roy Harrington in the **QTR Stepwedge Tool**, which can be downloaded from http://www.quadtonerip.com/html/QTRdownload.html. The download includes a StepWedge PDF that fully explains the process.[2]

Happy Profiling.

[2] Those who do not have Photoshop may be able to use the method of linearization discussed at headings 2-4 of http://www.paulroark.com/BW-Info/Making_B-W_ICCs-GrayCard.pdf.