

Profiling a Media with Roland VersaWorks

This document describes the procedure for creating media profiles in VersaWorks. VersaWorks provides profiling functions such as density linearization (or calibration), ink limiting and print mode customization through Media Explorer window. ICC profiles must be created with a third party profiling application. In this document, X-Rite ProfileMaker Pro 5.0 and i1Profiler are used as a reference.

System Requirements

- Computer with latest version of VersaWorks
- Supported Roland printer
- Supported spectrophotometer

Tech Tip: For the list of supported devices, navigate to **[Edit]** menu, select **[Preferences]** and then select the **[Measurement Instrument]** tab. The supported devices are listed in **[Hardware Settings (for Media Explorer)]**.

- Profiling software capable of producing CMYK output ICC profiles (recommend ICC version 4.x)
- Capability to produce and measure the output on the final substrate (E.g. heat press for heat transfer media)
- Benchmark image for testing the quality of profiles

Preparing Your System

Media profile reflects the state of your entire system and the conditions of your printing environment. A good quality profile can only be created when your entire system is properly calibrated and operating within the specifications. Please follow the recommendations described in the following section for preparing your system for profiling.

Preparing the Printer and Pre-Testing the Media

Before starting any profiling work, make sure the printer is operating at its optimal conditions:

- Printer is set to **[FULL WIDTH SCAN]**.
Tech Tip: For VersaUV printers, setting the printer to **[FULL WIDTH SCAN]** is not necessary.
- All nozzles are firing properly (no missing or deflected nozzles).
- Bidirectional printing alignment is corrected for the media being profiled.
- Media feed calibration is adjusted for the media being profiled.

Please consult the printer manual for details on performing the adjustments above.

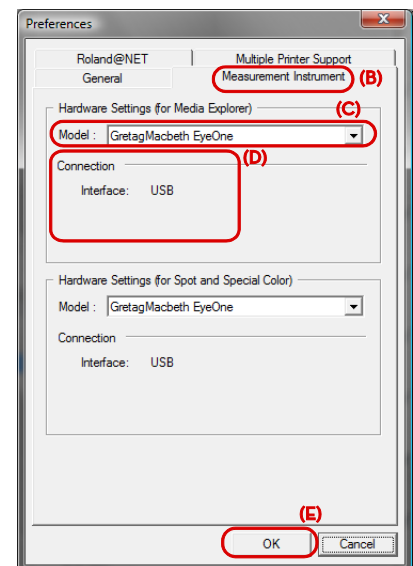
It is strongly recommended to test the media for compatibility prior to begin profiling. A good starting point is to test the media with any Generic profiles available in VersaWorks and check whether you can get acceptable prints on any print mode. It is not necessary to judge color accuracy at this stage but you should look for issues such as ink bleeding, drying time, saturation of colors and persistent banding not caused by feed accuracy.

Profiling can compensate for some issues but it will never make an incompatible media with severe printing problems to work with your printer.

Configuring VersaWorks Preferences

Make sure the spectrophotometer is connected to the computer with VersaWorks and that all required driver and profiling software are installed and working correctly. Configure VersaWorks for the spectrophotometer in use as follow:

- Start VersaWorks and navigate to **[Edit]** menu and select **[Preferences]**.
Tech Tip: Double clicking on the computer icon will also open the **Preferences** window.
- Select the **[Measurement Instrument]** tab.
- In **[Hardware Settings (for Media Explorer)]**, select the spectrophotometer from the **[Model]** list.
- In **[Connection]**, set the communication parameters to match the device settings if necessary.
- Click **[OK]** to close Preferences window.



Configuring VersaWorks Queue Settings

During profiling, VersaWorks sends several jobs to the printer through the Queue A. Although most of printing parameters are determined by media settings in Media Explorer, some layout and printer control settings are still dictated by Queue Settings. Set the following options in the **[Queue A Properties]** window:

- A. Navigate to **[Edit]** menu and select **[Queue A Settings]**.

Tech Tip: Double clicking on the [A] folder icon will also open the **[Queue A Properties]** window.

- B. Select the **[Layout]** button.

- C. Click on **[Get Media Width]** button to retrieve the media size information from the printer.

- D. For some specialty media like heat transfer material, selecting the **[Mirror]** option is necessary for the transfer process.

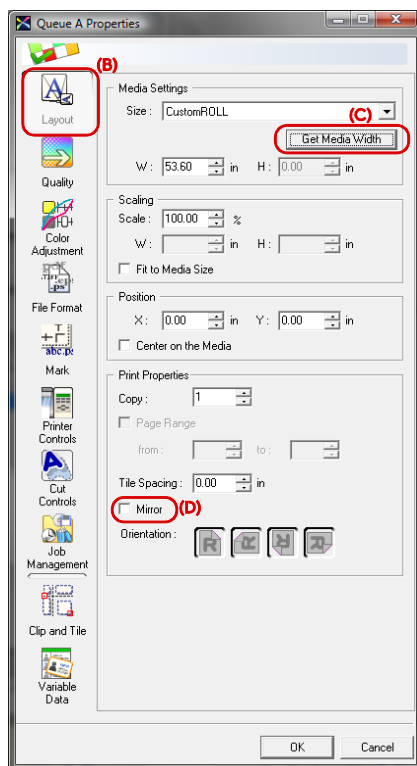
- E. Select the **[Mark]** button.

- F. Place a check mark next to **[Print Job Properties]** and then to **[Quality Settings]** and **[Date/Time]**. This is helpful when profiling multiple types of media and print resolutions. This will add annotations to the charts to make it easy to determine which charts need to be measured later.

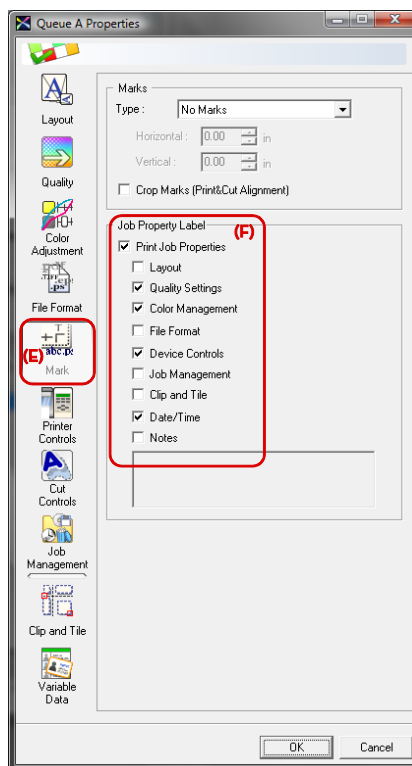
- G. Select the **[Printer Controls]** button.

- H. On some printers, the heater settings can be controlled from VersaWorks by selecting **[Custom Settings]** or **[Use Default Media Settings]**. Other settings such as **[Feed Calibration]** and **[Vacuum Power]** are determined by media settings in Media Explorer.

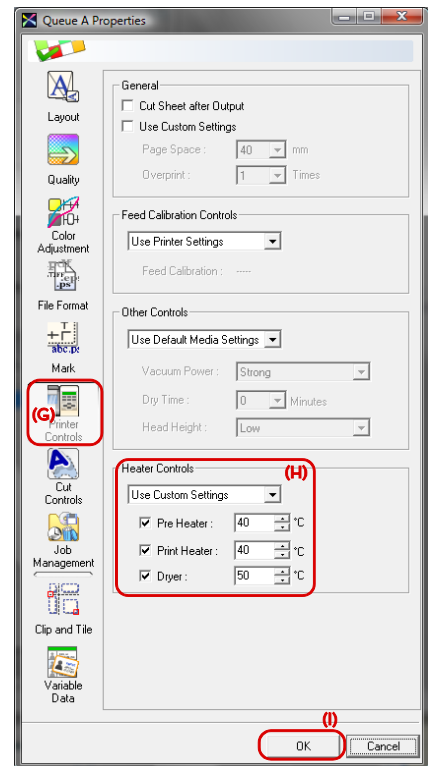
- I. Click **[OK]** to close **[Queue A Properties]** window.



Queue Properties – Layout



Queue Properties – Mark




Queue Properties – Printer Controls

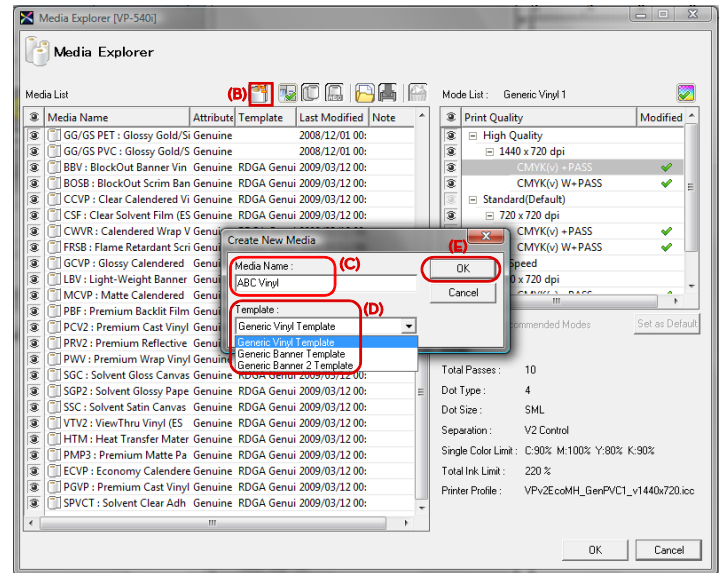
Creating a New Media in Media Explorer

Media Explorer manages the list of media profiles available for the current printer and ink configuration. In order to profile a new media, a media setting for the new media must be created.

Create a new media setting in Media Explorer as follow:

- A. Navigate to **[Media]** menu and select **[Media Explorer]** in VersaWorks.
- B. Click on **[Create New Media - 

Tech Tip: The following media templates or a subset of this list are available for selection:**



[Generic Vinyl Template] – Select this template for most of adhesive back vinyl or paper products.

[Generic Vinyl Dry Template] - Select this template when profiles created with Generic Vinyl Template produce prints with dark banding (dark lines between the passes) or the ink takes too long to dry.

[Generic Vinyl Rich Template] – Select this template when profiles created with Generic Vinyl Template produce prints that are faded and lacks saturation.

[Generic Banner Template] – Select this template for most of banner products.

[Generic Banner Rich Template] – Select this template when profiles created with Generic Banner Template produce prints that are faded and lacks saturation.

[Generic Clear Film Template] – Select this template when profiling clear media and/or requires 'White' ink.

[Generic Clear Film Dry Template] – Select this template when profiles created with Generic Clear Film Template produce prints with dark banding (dark lines between the passes) or the ink takes too long to dry.

[*** Template [MT]]** – Select template with [MT] designation when creating profiles that requires Metallic ink.

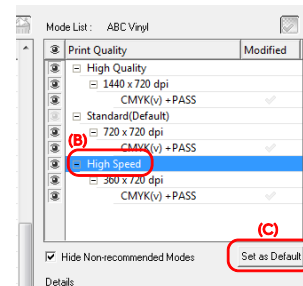
Configuring the Print Modes

Each media template has a set of recommended print modes that are automatically enabled and listed in the **[Mode List]** section of Media Explorer. In general, the recommended mode configuration should work well for most of media but the configuration can be modified to list only the modes that work well with the media.

Changing the Default Print Mode:

The default print mode is the mode that is automatically selected when the media is selected in Job Settings or Queue Settings. The mode marked as default such as in **[Standard(Default)]** is the current default mode. To change the default print mode, follow the steps provided below.

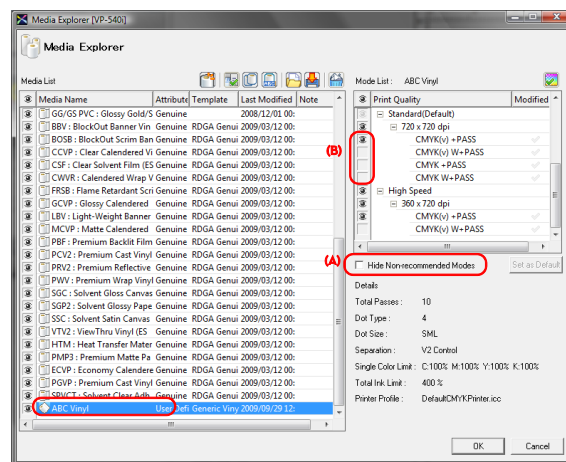
- Select the new media in Media Explorer.
- In **[Mode List]** section, select the print mode that will be set as the new default print mode.
- Click on **[Set as Default]** button. The new default mode displays with the "(Default)" suffix.



Enabling and Disabling Print Modes:

Not all available print modes are listed in Mode List by default. The hidden modes can be enabled if necessary. Similarly, modes that are unnecessary or do not produce acceptable results can be disabled to avoid mistakes.

- With the new media selected in Media Explorer, uncheck the **[Hide Non-recommended Modes]** option. All available modes in media template are listed.
- Click on the **[Eye]** (👁) icon to toggle between enabled and disabled. Modes showing the Eye icon will be available for printing. The default print mode or modes that are being used by any jobs or Queue Settings cannot be disabled.



Tech Tip: Additional information on print modes:

CMYKLcLm(v) or **CMYKLcLm** – the **LcLm** suffix indicates that the mode is a 6-color mode using the light-cyan and light-magenta inks. The **(v)** suffix means that the mode uses multiple droplet sizes (variable dot) when printing. Modes without the **(v)** suffix use a single droplet size (fixed dot).

CMYK – CMYK modes without the **(v)** suffix are available in modes with symmetric resolutions such as 720x720 dpi, 1080x1080 dpi and 1440x1440 dpi. These modes are special modes for printing screen positives/negatives on films. **[Halftone Options]** is available on these modes allowing screening parameters such as the screen angle, frequency and dot shape to be specified. Check the VersaWorks help for more details.

+PASS, W+PASS or **+PASSv2** – these suffixes indicate that these modes use Roland Intelligent Pass Control for improved print quality.

The **[Details]** section displays additional information for the print mode selected in the **[Mode List]** as follow:

[Total Passes] – Displays the number of times the head travels to print a band equivalent to the head size. The print quality improves as the number of passes increases but the print speed decreases.

[Dot Type] – Displays the dot firing pattern. The appropriate mode is automatically selected for each resolution and media type.

[Dot Size] – Displays the dot sizes that are used. **[SML]** means that Small, Medium and Large dots are used.


[Separation] – Displays the printing control method selected for the media. The appropriated method is automatically selected based on the media type.

[Single Color Limit] - Displays the ink limit for each individual color channel.

[Total Ink Limit] - Displays the combined ink limit of all color channels.

[Printer Profile] - Displays the ICC profile associated with the print mode.

Setting the Printer Control Parameters

[Printer Controls] and **[Cut Controls]** windows hold the common parameters that apply for all print modes. To display the **[Printer Controls]** or **[Cut Controls]** window, double-click on the media name in Media Explorer or select the media and click on **[Media Characteristics Settings - ** button.

Printer Controls

[Overprint] – Enter the number overprints. Overprinting is the process of overlaying the same image multiple times to increase the saturation. Absorbent media such as fabric banner may require overprinting for improved color saturation.

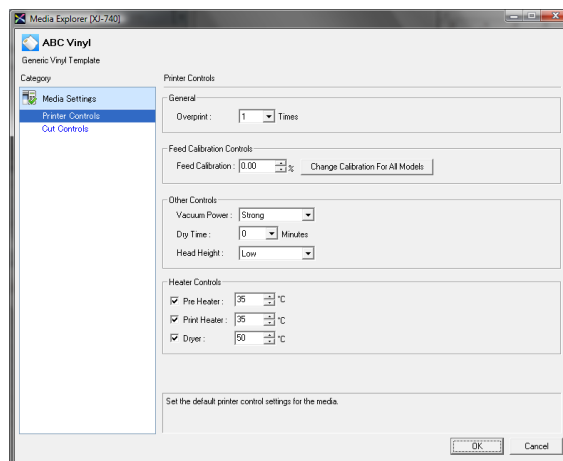
[Feed Calibration Controls] – Enter the feed adjustment value for the media. Calibration values for all models in the same printer series can be entered by clicking on **[Change Calibration For All Models]** button.

[Vacuum Power] – Select the appropriated vacuum setting for the media. It is recommended to experiment with different settings. The **[Strong]** option is typically appropriated for adhesive back vinyl but it can cause feeding issues on soft and thin media. Banner tends to work better with **[Normal]** settings.

[Dry Time] – Enter the interval of time the printer waits before executing the next operation (sheet cut, cutting or printing of next job).

[Head Height] – Select the appropriated head height for the media in order to avoid head strikes.

[Heater Controls] – Enter the heater settings for the media. Setting the temperature too high can cause the media to buckle excessively, or the ink drop to dry too fast not giving enough time to spread. By the other hand, setting the temperature too low can cause bleeding and the output may not dry quickly enough for immediate handling.



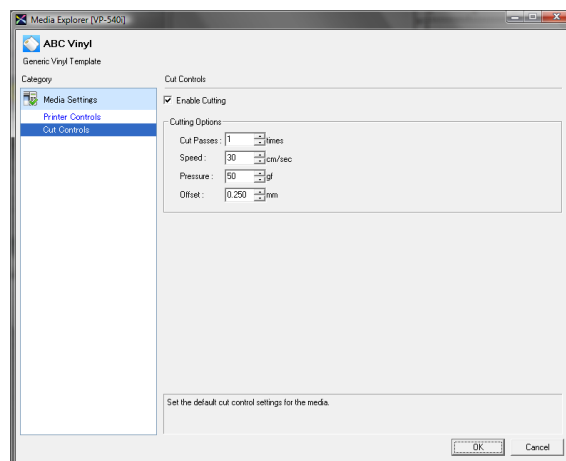
Cut Controls

Options in this window are only available if the printer supports contour cutting.

[Enable Cutting] – This option must be checked on any media intended to be cut with the integrated cutter. Cutting operation will be completely disabled for this media if this option is left unchecked.

Other parameters such as **[Cut Passes]**, **[Speed]**, **[Pressure]** and **[Offset]** can also be set in this window but they are not used in general, since these parameters may vary depending on the state and quality of blade (new or used).

Click **[OK]** to close Media Settings and return to Media Explorer.



Profiling the Media

The profiling can be started after the media has been created and configured in Media Explorer. The following steps must be performed for each print mode:

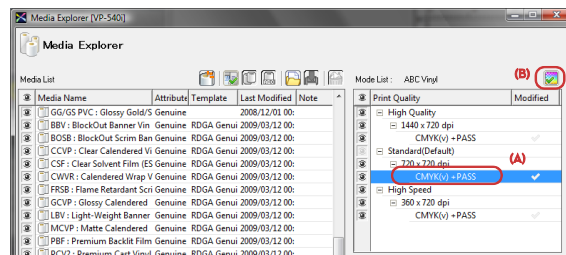
1. Set the Quality Settings specific for the print mode
2. Print and measure the density calibration target
3. Adjust the calibration curves
4. Print the ink limit chart and determine the ink limit
5. Print the color target
6. Measure the color target and create the ICC profile
7. Associate the ICC profile with the print mode
8. Test the image quality of profile

1. Setting the Quality Settings for the Print Mode

Follow the steps below to start the profiling process.

- A. Select the print mode in **[Mode List]** section of Media Explorer.
- B. Click on **[Print Quality Settings -]** button.

Tech Tip: Double clicking the print mode also displays the Quality Settings window



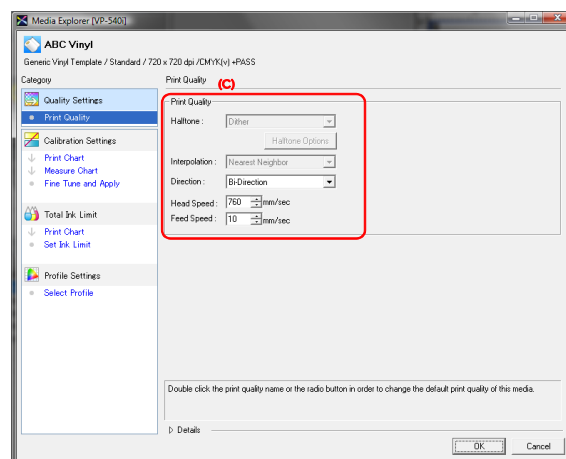
- C. In **[Print Quality]**, adjust the following parameters if necessary:

[Direction] – set the default print direction. Setting **[Uni-Direction only]** or **[Bi-Direction only]** locks the **[Direction]** option preventing changes in this option from Job Settings or Queue Settings.

[Head Speed] – set the default head travel speed.

[Feed Speed] – set the default media feed speed.

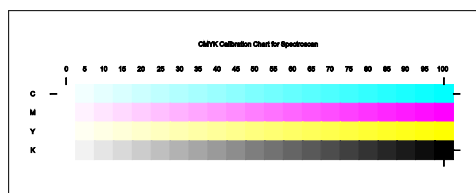
In general, it is not necessary to change the default settings unless the print results are not acceptable. As a general guideline, the print quality improves by selecting unidirectional printing and by slowing down the head speed.



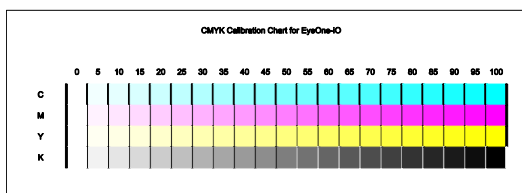
2. Printing and Measuring the Density Calibration Chart

- Select **[Print Chart]** in Calibration Settings section.
- Enter the individual ink limit in **[Single Color Limit]** fields.
- Click **[Print]**.
- Click **[OK]** in the confirmation window. The calibration target is printed. The chart format varies according to the spectrophotometer selected in VersaWorks Preferences (see **Configuring VersaWorks Preferences**). Check for issues such as bleeding, banding or any other quality issues and go back to step B above if any adjustment in the individual color limit is necessary.

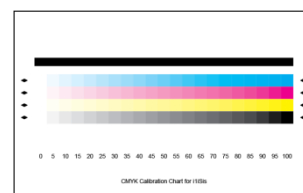
Tech Tip: If you are profiling a heat transfer media, transfer the image on to an actual substrate for taking the measurements.



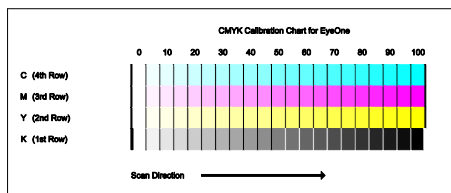
GretagMacbeth – Spectroscan



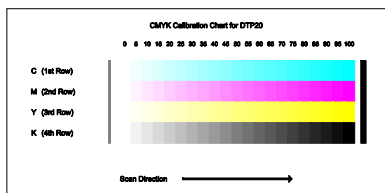
X-Rite i1 IO



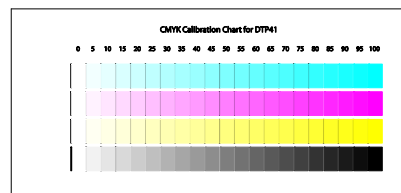
X-Rite i1 iSis



GretagMacbeth – EyeOne



X-Rite DTP20

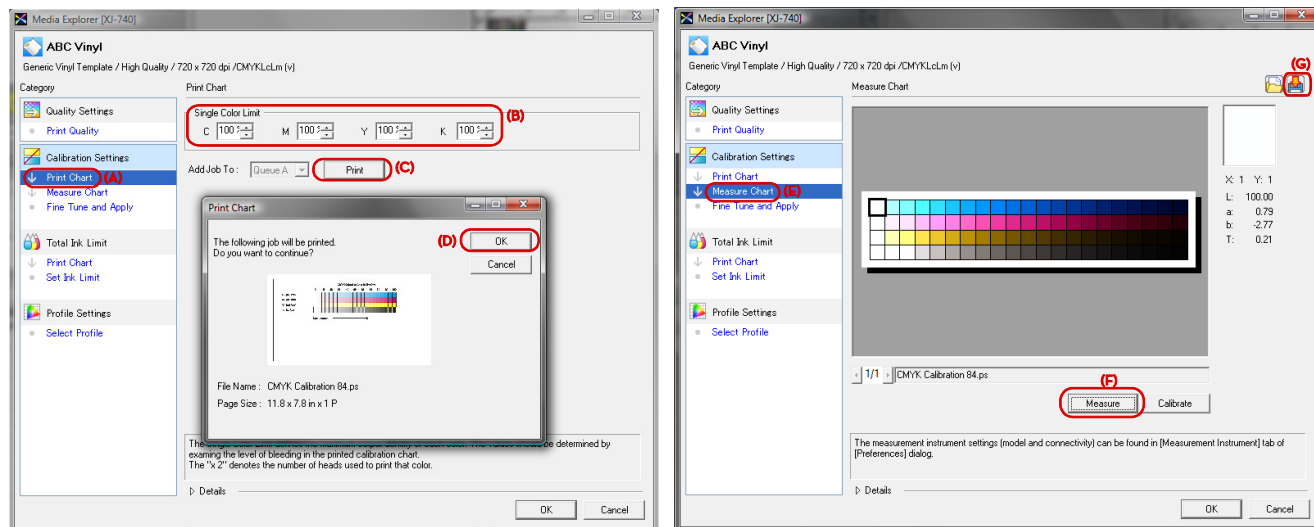


X-Rite DTP41

- Select **[Measure Chart]** to display the measurement window.
- Click **[Measure]** and follow the instructions to measure the calibration chart.

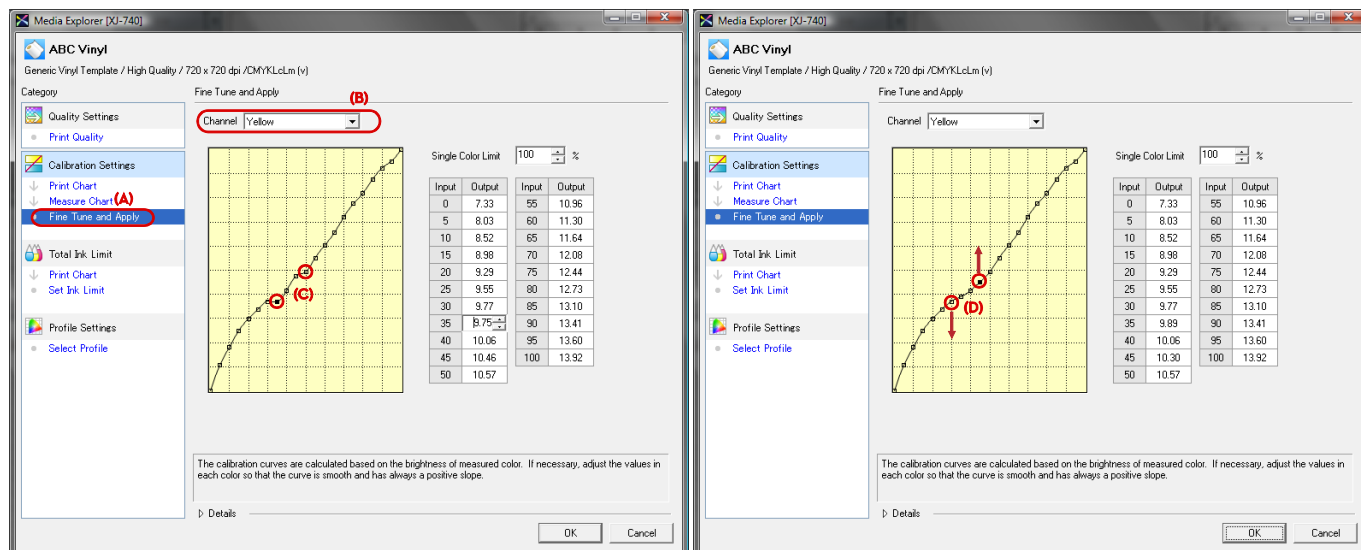
Creating Profiles with VersaWorks

- G. Once the measurement is completed, you have the option to save the measurement data by clicking the **[Save]** button.



3. Adjusting the Calibration Curves

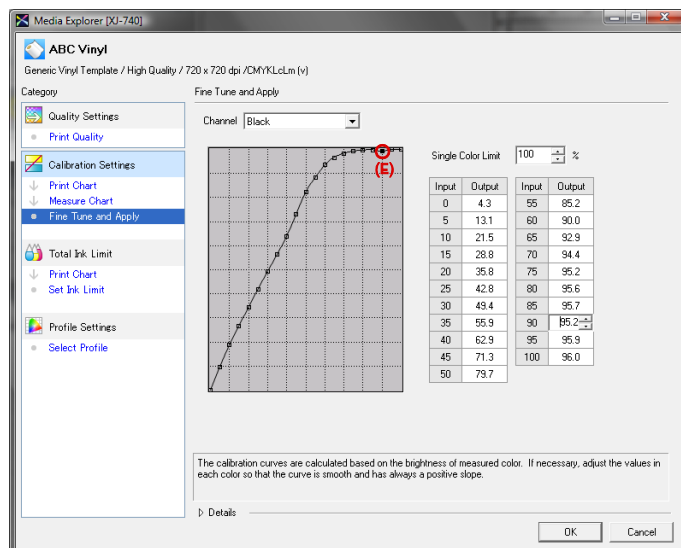
- Select **[Fine Tune and Apply]** in Calibration Settings section.
- Cycle through the list of ink channels in **[Channel]**.
- Check for any abnormal spikes or dips in the calibration curve. The values on the vertical axis should always increase as you move to the next point to the right in the density curve.
- Adjust manually the curves eliminating any spikes or dips. The adjustment should be limited to the minimum necessary. Changes that alter greatly the shape of the calibration curves must be avoided. If a curve requires drastic change, go back to step 2-A to reprint and measure again the calibration target.



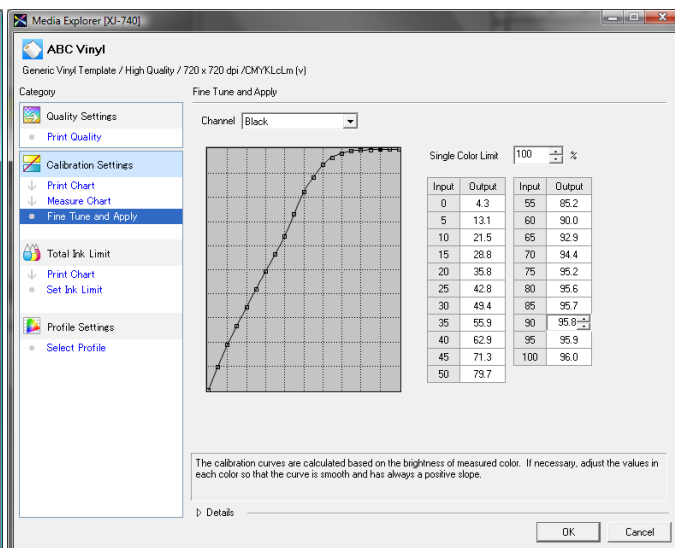
Yellow curve – Before the adjustment.

Yellow curve – After the adjustment.

- E. It is common for the black curve to saturate (flatten) in higher ink density areas. This is not a problem as well as dips or spikes are smoothened out.



Black curve – Before the adjustment.



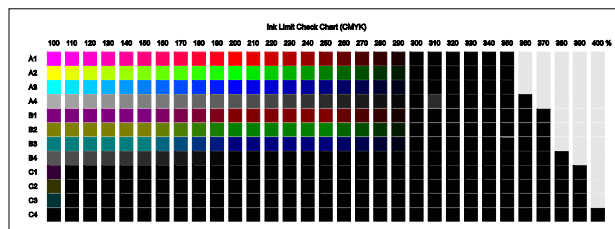
Black curve – After the adjustment.

4. Setting the Total Ink Limit

- Select **[Print Chart]** in Total Ink Limit section.
- Click **[Print]**.
- Click **[OK]** in the confirmation window. The Ink Limit Check Chart is printed.

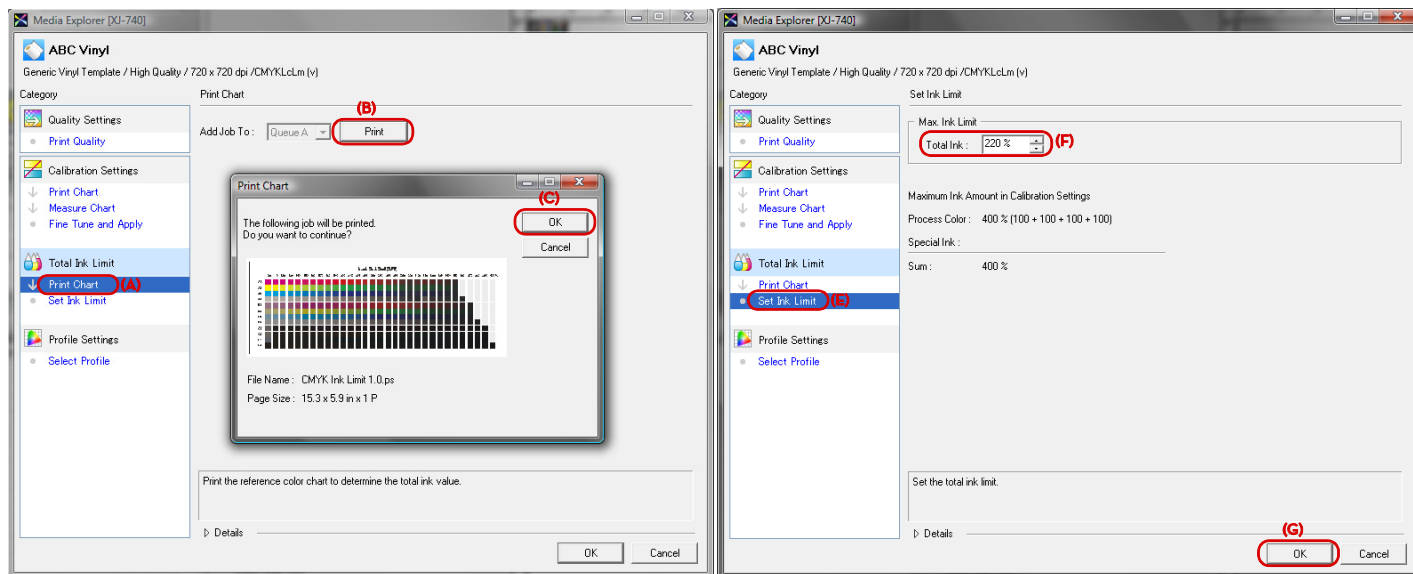
Tech Tip: If you are profiling a heat transfer media, transfer the image on to an actual substrate for evaluating the output.

- Look for issues such as bleeding, ink pooling, banding, excessive drying time or any other undesirable printing artifact to determine the maximum amount of ink that the media can accept at this print mode.
- Select **[Set Ink Limit]**.
- Enter the value determined above in **[Total Ink]**.



- Tech Tip:** **[Total Ink]** of less than 160% generally translates into poor print quality. If this is the case, go back to step 2-A and lower the **[Single Color Limit]** value to get a **[Total Ink]** value around 200%.
- Click **[OK]** and go back to Media Explorer.
 - Click **[OK]** in Media Explorer and then click **[Yes]** to save the changes.

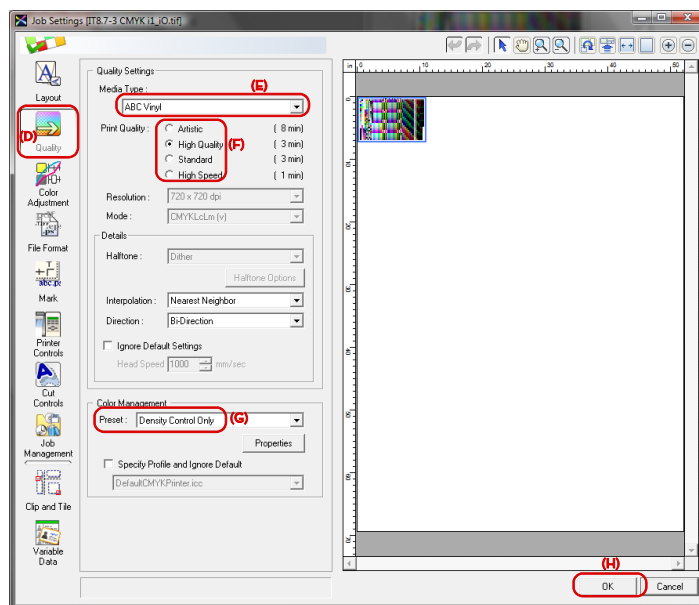
Creating Profiles with VersaWorks



5. Printing the ICC Color Target

- A. In VersaWorks navigate to **[File]** menu and select **[Add Job to Queue A]**.
- B. Locate the CMYK ICC target chart file (4-color) provided with your profiling software and click **[Open]**. Consult the manual of your software for the appropriated test chart. It is recommended to use targets with more than 400 swatches (IT8.7-3 CMYK i1_iO.tif is shown in this screenshot as a reference).
- C. Select the ICC target chart in VersaWorks queue and navigate to **[Job]** menu and select **[Settings]** to open Job Settings window.
- D. Select **[Quality]**.
- E. Select the media being profiled in **[Media Type]**.
- F. Select the print mode being profiled in **[Print Quality]**
- G. Select **[Density Control Only]** in **[Preset]**.
- H. Click **[OK]** to close Job Settings window.
- I. Select the job in VersaWorks queue and navigate to **[Job]** menu and select **[Print]** to print the chart.

Tech Tip: If you are profiling a heat transfer media, transfer the image on to an actual substrate for taking the measurements.

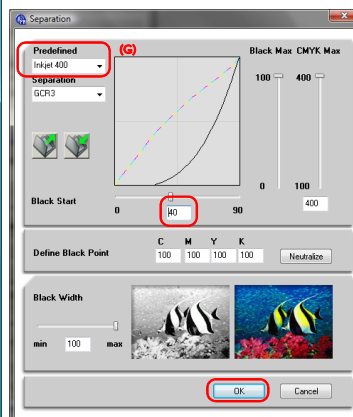
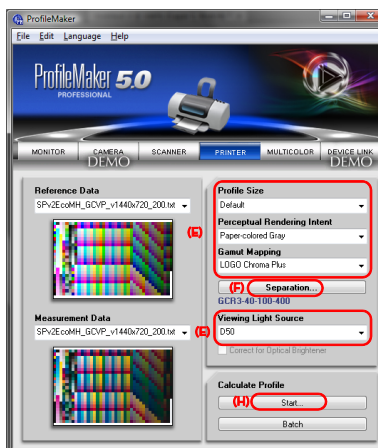
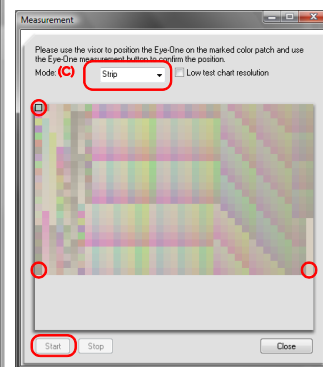
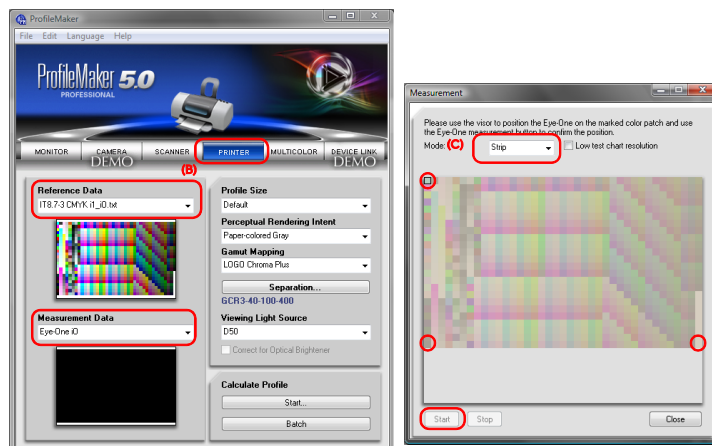


Look for any printing issues to determine whether the ink limit entered in step 4-F was adequate for this media. If not, go back to 4-A and set a different ink limit value and repeat the steps.

6. Reading the ICC Target and Creating the ICC Profile

Using your profiling software, measure the profiling target and create the ICC profile. X-Rite ProfileMaker Pro 5.0 and X-Rite i1iO were used below:

- A. Launch **ProfileMaker Pro**.
- B. Select **[PRINTER]** and then select the **[Reference Data]** and the measurement device in **[Measurement Data]**.
- C. Place the target on the measurement table, select **[Strip]** and click **[Start]**. Position the visor on the swatches and press the button as instructed on screen to start the measurement.
- D. Click **[Yes]** to save the measurement data.
- E. Select **[Default]** in **[Profile Size]**, **[Paper-colored Gray]** in **[Perceptual Rendering Intent]**, **[LOGO Chroma Plus]** in **[Gamut Mapping]** and **[D50]** in **[Viewing Light Source]**.
- F. Click on **[Separations]**.
- G. Select **[Inkjet 400]** in **[Predefined]**, **[40]** in **[Black Start]** and click **[OK]**.
- H. Click **[Start]** to start the generation of ICC profile and enter the profile name. Make sure the file name is unique and easily identifiable.



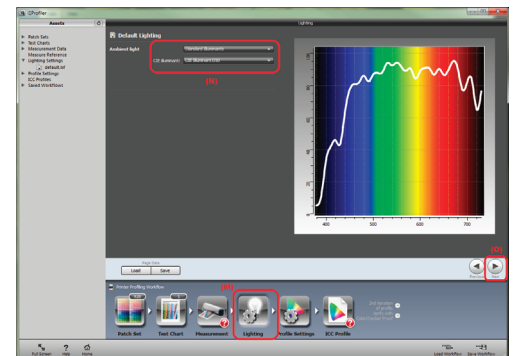
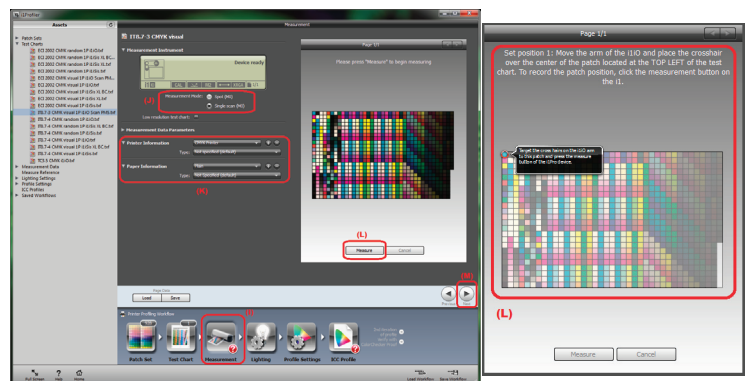
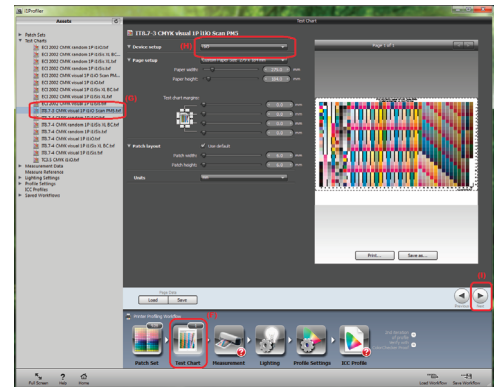
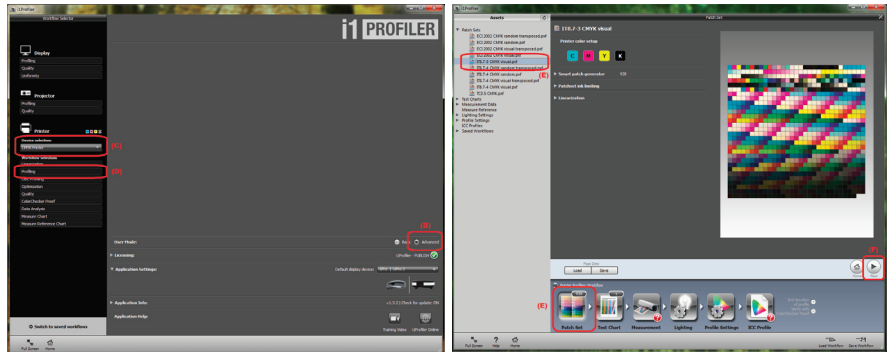
Creating Profiles with VersaWorks

X-Rite i1Profiler and X-Rite i1iO were used below:

- A. Launch **i1Profiler**.
- B. Select **[Advanced]** under **[User Mode]**.
- C. Select **[CMYK Printer]** under **[Device Selection]**.
- D. Click on **[Profiling]**.
- E. Click on **[Patch Set]** and select the correct color patch from the set.
- F. Click **[Next]** to get to **[Test Chart]**.
- G. Under **[Test Chart]**, select the correct chart.
- H. Under **[Device setup]**, make sure correct device is selected.

Tech Tip: No need to print the color chart from here as the color chart should have been printed from Roland VersaWorks (see **5. Printing the ICC Color Target**).

- I. Click **[Next]** to get to **[Measurement]**.
- J. Under **[Measurement Mode]**, select **[Single scan]**.
- K. Enter all the necessary information for **[Printer Information]** and **[Paper Information]**.
- L. Click **[Measure]** and follow the instruction on the screen to start the measurement.
- M. Click **[Next]** to get to **[Lighting]**.
- N. Make all the necessary adjustment under **[Ambient light]** setting.

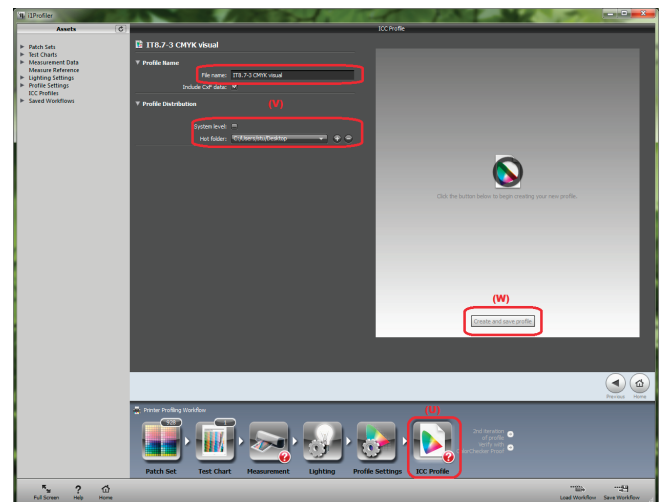
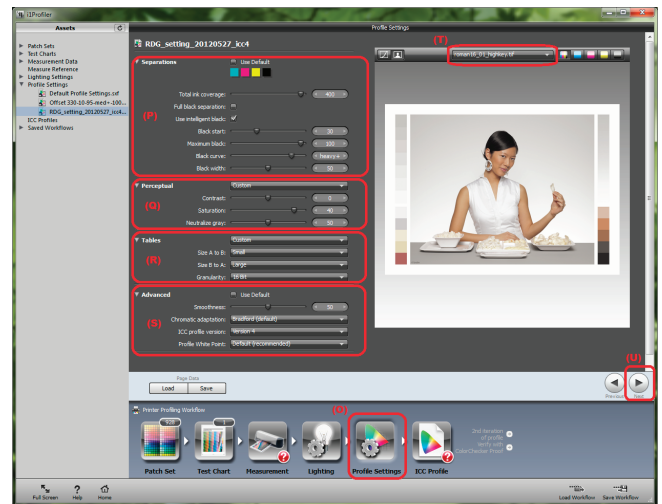


Creating Profiles with VersaWorks

- O. Click **[Next]** to get to **[Profile Settings]**.
- P. Under **[Separations]**, set **[Total ink coverage]** to **[400]**, check **[Use intelligent black]**, set **[Black start]** to **[30]**, set **[Maximum black]** to **[100]**, set **[Black curve]** to **[heavy+]**, and set **[Black width]** to **[50]**.
- Q. Under **[Perceptual]**, select **[Custom]** and set **[Contrast]** to **[0]**, set **[Saturation]** to **[40]**, and set **[Neutralize gray]** to **[50]**.
- R. Under **[Tables]**, select **[Custom]** and set **[Size A to B]** to **[Small]**, set **[Size B to A]** to **[Large]**, and set **[Granularity]** to **[16 Bit]**.
- S. Under **[Advanced]**, set **[Smoothness]** to **[50]**, set **[Chromatic adaptation]** to **[Bradford]**, set **[ICC profile version]** to **[Version 4]**, and set **[Profile White Point]** to **[Default]**.
- T. Scroll down to see different images for visual assessment of the ICC profile settings.

Tech Tip: Above settings are recommended settings. If you need specific profile setting, please adjust these settings accordingly to accommodate your profile needs.

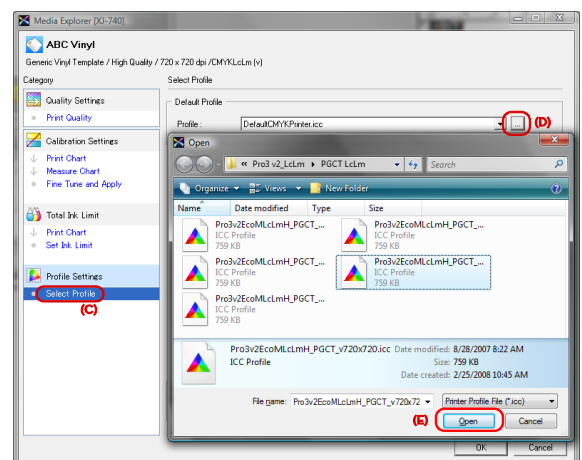
- U. Click **[Next]** to get to **[ICC Profile]**.
- V. Enter the profile name and folder location. Make sure the file name is unique and easily identifiable.
- W. Click **[Create and save profile]** to start the generation of ICC profile.



7. Associating the ICC Profile with Media Settings in VersaWorks

The ICC profile generated in step 6 must be associated with the media settings in Media Explorer.

- A. In VersaWorks, navigate to **[Media]** menu and select **[Media Explorer]**.
- B. Select the media and the print mode being profiled and click **[Print Quality Settings -]**.
- C. Select **[Select Profile]**.
- D. Click **[Browse]**.
- E. Locate the profile created in step 6 and click **[Open]**.



Tech Tip: A warning will be displayed if a profile with the same name is already installed in VersaWorks. Make sure you are not overwriting profiles that are used in other media and rename the new profile if needed.

F. Click **[OK]**.

G. Go back to step 1 to profile a new print mode or close Media Explorer and test the profile.

8. Testing and Evaluating Profiles

A color viewing station such as the ones shown here are recommended for proper evaluation of color quality.

Test the profiles by printing a reference image. A good test file should contain both RGB and CMYK objects; cover a wide gamut of colors, dark, light images and gradients.

Look for any printing artifacts, neutrality of colors, sharpness, saturation or any other criteria that suits your needs in determining the validity of profiles.

See the general guidelines on troubleshooting the most common issues:



A. Banding in dark areas of the image

Possible solutions: a) increase the heater temperature; b) slow down the print speed (unidirection or slower head speed); c) lower total ink limit (requires re-profiling); d) lower individual ink limit (requires re-profiling); e) use a print mode with W+PASS suffix; f) recreate the media using different template such as [Generic Vinyl Dry Template] if available.

B. Streaking (white banding, density drop, etc)

Possible solutions: a) lower the heater temperature; b) slow down the print speed (unidirection or slower head speed); c) slow down the feed speed; d) re-profile using a different media template; e) use a print mode with W+PASS suffix.

C. Gray not neutral

Assuming the color was evaluated under a color viewing station: a) make sure the ICC profile creation settings are correct (consult the manual of profiling software); b) re-profile from scratch.

D. Grainy image

Possible solutions: a) make sure the bidirectional adjustment is correct; b) try unidirection; c) graininess may be caused by excessive ink limiting. Try re-profiling with higher ink limits; d) re-profile using a print mode with W+PASS suffix.

E. Flat looking image or not able to hit certain saturated colors

Possible solutions: a) try re-profiling with higher ink limit values; b) re-profile using slower print modes (W+PASS) or higher resolution modes.

F. Gradient not smooth

Possible solutions: a) make sure the calibration curves are smooth (adjusting calibration curves requires re-profiling); b) re-profile from scratch changing slightly the [Single Color Limit].

G. Clipping in shadows or not enough detail in shadows

Possible solutions: a) try different rendering intent (Perceptual for raster images); b) re-profile with different ink limit settings.