TECHNICAL BULLETIN

PROFILING

A Note Before You Start:

Always calibrate your printer before profiling. Follow the steps outlined in the printer's user manual for printer calibration. In this case, calibration refers to the setup processes performed on the printer and are specific to that printer model (it's not the same as the SoftRIP calibration described below). Calibration processes include media feed calibration, bi-directional calibration, head height, media thickness, head speed, and any other calibrations prescribed by the printer manufacturer. These settings should remain constant during profiling. All calibrations should be redone after loading any new substrate/material. In short, the printer should be in its optimal operating condition.

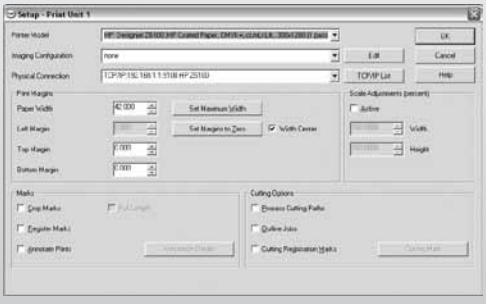

Illustration 1a: Setup screen

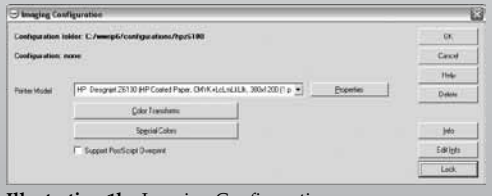

Illustration 1b: Imaging Configuration screen

Getting Started

This document will teach you how to create ICC profiles using a combination of Wasatch SoftRIP® and a third party color profiling software package such as ColorBlind, Monaco, ProfileMaker, etc. We recommend that you allocate a minimum of 20 feet of media to produce each profile.

Although this document provides a detailed discussion of how to create profiles using SoftRIP, you will also need to refer to your profile making software manual for intermediate steps where noted. Further, it will provide instructions for importing the profile and printing a final test of your new Imaging Configuration (IC). It will also cover processes for collecting, distributing, and installing profiles at a remote site.

Step 1: Setup Configuration

Launch Wasatch SoftRIP and select "Setup" from the Print menu.

To begin, select your Printer Model and set your Imaging Configuration to "none" on the Setup screen (Illustration 1a). Once you have made these selections, **DO NOT change any settings during the profiling process. Changes to these settings will require starting over. Proceed as follows:**

On the Setup screen, check Annotate Prints and the Annotation Details window will open. We recommend you turn on "Printer," "Imaging Configuration," "Date/Time," and "Comment" so each image will be printed with your settings and additional comments.

On the Setup screen, click on the "Edit" button. This will launch the Imaging Configuration screen (Illustration 1b).

On the Imaging Configuration screen, click the "Properties" button. This will launch a control screen that provides additional settings and/or print modes (i.e. various resolutions, ink modes, etc.) for your printer.

Every printer has a different set of print properties. Determine your intended output configuration and select from features included with your printer, such as: Print Direction, Print Quality, Dot Volume, Ink Type, Number of Passes, etc.

When you have completed your settings, click OK.

NOTE:

It is extremely important that all printer settings, halftone settings, inks, media, print modes, and other factors that affect the print condition be set prior to beginning the linearization process. DO NOT CHANGE THESE SETTINGS AT ALL DURING THE PROFILING PROCESS.

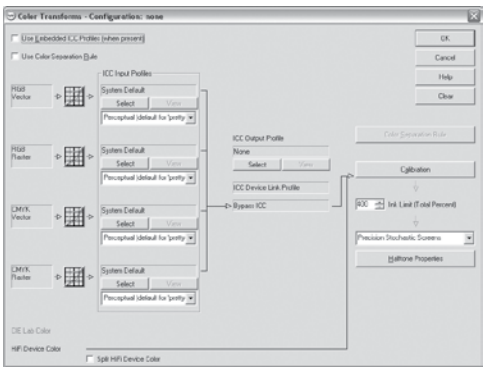

Illustration 2a: Color Transforms screen

Back on the Imaging Configuration screen, click the "Edit Info" button and create a text file to record the properties you selected as part of your configuration. This is helpful if you plan to distribute your final IC and is a good place to keep track of your notes as you build your IC. When you click "Edit Info," your default text editor will open for you to enter notes. When you're done, select "Save" from the File menu and your "info.txt" file will be linked to the Imaging Configuration name you select. This information will be available to anyone who clicks on the "Info" button later. You can also edit this file at any time. After saving, exit the text editor and you will be returned to the Imaging Configuration screen.

Step 2: Color Transforms Configuration

Click on the "Color Transforms" button to launch the Color Transforms screen (Illustration 2a). This is your master color flowchart screen. You will notice that all color data is cleared and set to none or default (as a result of setting IC to none). In the lower right hand corner of the screen, you will see that "Precision Stochastic Screens" is displayed as the default halftone method. For most applications, Precision Stochastic Screens is the preferred halftone method, and stock Wasatch ICs are created using them.

However, you may choose other halftone methods from this window on which to build a profile. Whatever halftone method you choose will be incorporated into the IC you create. Changing it later will invalidate the Imaging Configuration. (**NOTE:** This technical document only covers processes for profiling with Precision Stochastic Screens. Profiling steps will vary for other halftone methods.)

In the "ICC Input Profile" column on the left side of the Color Transforms screen, you should now see all four input color spaces set to "System Default." You will also see that the default rendering intent of "Perceptual" has been set. If your workflow includes using embedded profiles, check the "Use Embedded ICC Profiles" box.

Click OK to exit the Color Transforms screen and click OK again to exit the Imaging Configuration Screen. A "Save As" window will open prompting you to name your new Imaging Configuration. We recommend naming your "in-progress" IC with a name like "Unlinearized_None." If you are making profiles in a production capacity, you may want to avoid having too many ambiguously named ICs by using a more detailed naming system like "Unlinearized_None_resolution_inktype_media." Once you save the IC, you will be returned to the Setup screen.

Step 3: Test Prints

On the Setup screen, make any other non-color related selections required for printing. These settings include Physical Connection, Paper Width, etc. Click OK and you are now ready to print your test prints.

In the File menu, select "Open" and browse to C:\psfiles and select the appropriate target file for your densitometry device, such as generalTest018eyeone.ps or generalTest018dtp20.ps ("018" is the current test version, but may change as new test versions become available). **NOTE:** The exact location of the "psfiles" folder may vary depending on the drive to which it was assigned when SoftRIP was installed.

Open one of these files and select "RIP and Print" to print the file. You will use it in the next section.

Step 4: Determine Ink Limiting

In this step, you may decide to perform an Individual Channel Ink Reduction to one or more individual channels. You may also need to perform a Total Ink Limit, which is an adjustment to the total ink deposit. An Individual Channel Ink Reduction is intended to correct an individual ink channel or ink chemistry problem. For over-saturation issues, a Total Ink Limit should be applied. These are separate functions and are performed on different controls, as described further below.

INDIVIDUAL CHANNEL INK REDUCTION: To determine if you need an Individual Channel Ink Reduction, examine the color patches on "generalTest018eyeone.ps" or on "generalTest018dtp20.ps" (Illustration 4a). Individual Channel Ink Reduction is performed for each channel, so look at the patches for each color individually. Compare each color square with the one next to it. Every square should be visibly different from its neighbors. If two neighboring squares look the same and have no visible density difference, an Individual Channel Ink Reduction should be applied on that specific channel.

Each test pattern moves from 100% to 0% in 6% increments. No two patches should look like they have the same density. Locate the two patches with the greatest percentage that are visibly different and set an Individual Channel Ink Reduction equal to the percentage of the darker patch. Remember that Individual Channel Ink Reductions affect the entire color gamut, so they should be used sparingly.

If printing with diluted inks (light cyan, light magenta, light black, gray, light gray, etc.) and the printer is in a fixed dot mode, check the Fixed Dot Ink Reduction control in Halftone Properties and perform all Individual Channel Ink Reductions in the Halftone Properties screen (Illustration 4b). For all other situations, leave Fixed Dot Ink Reduction unchecked and perform all Individual Channel Ink Reductions in the Calibration screen (Illustration 4c).

Use the slider controls to set your Individual Channel Ink Reductions. These controls may be used for any channel individually, or for all channels together if the Lock box is checked. After setting an Individual Channel Ink Reduction, re-save your IC (named "Unlinearized_None" or similar) and add notes on what changes were made by using "Edit Info" as described in Step 1.)

TOTAL INK LIMIT: Review your print of "generalTest018eyeone.ps" or "generalTest018dtp20.ps" to determine if you need a Total Ink Limit in addition to the Individual Channel Ink Reductions you made. The upper right area of your test print consists of three parts.

The first part is a step pattern from 0% to 400% total ink. For your Total Ink Limit, you should select the highest percentage square that is dry and does not have print artifacts (Illustration 4d).

NOTE: If you are using a print mode that includes ink channels other than KCMY (HiFi modes), and you feel that the 400% patches are not sufficient, you may want to use custom-made test files. In testing, Wasatch noticed improved results when the Total Ink Limit was applied within the profiling software rather than within SoftRIP.

Illustration 4d: Total Ink step pattern

IMPORTANT:

There are two places where Individual Channel Ink Reductions can be performed. One or the other will be used depending on the inkset being used or the dot mode being used. Never use both at the same time.

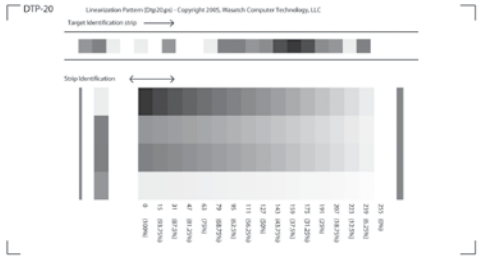

Illustration 4a: Color patches from 'generalTest018eyeone.ps' or 'generalTest018dtp20.ps'

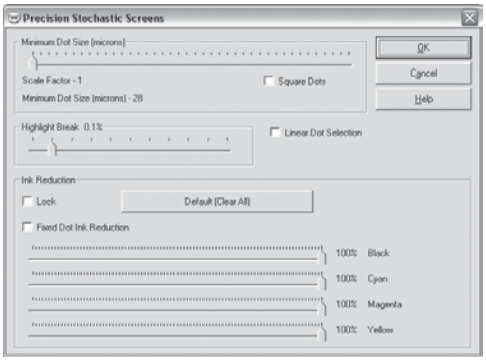

Illustration 4b: Halftone Properties screen (Print>Setup>Edit>Color Transforms>Halftone Properties)

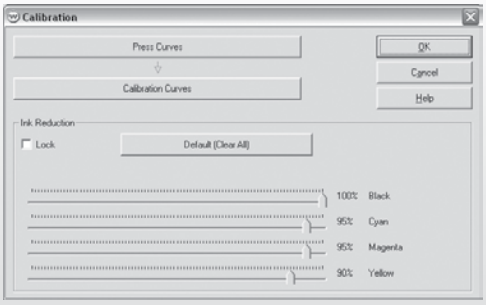

Illustration 4c: Calibration screen (Print>Setup>Edit>Color Transforms>Calibration)

Illustration 4e: Open boxes with composite blacks

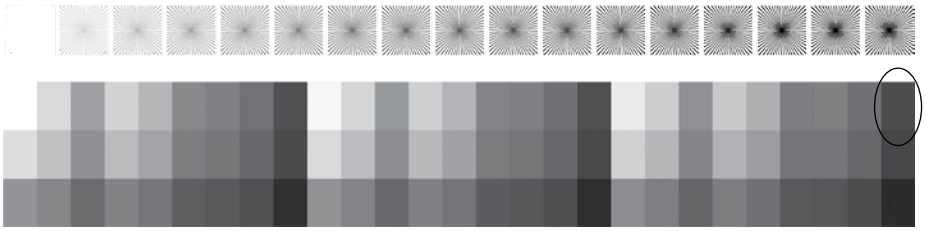

Illustration 4f: Swatches consisting of primary inks and CMY black

The second part is a series of open boxes consisting of composite blacks. Check this area for media bleed, over spray, and resolution issues (Illustration 4e).

The third part is a series of three rows of swatches located below the boxes of black lines. These swatches consist of primary inks and one CMY black at the upper-right corner (circled in Illustration 4f). The CMY black may show excessive bleeding or artifacts due to the "inks mixing" where the first two tests above do not. This is why it's very important to review this patch. Check this area for individual channel ink retention issues (Illustration 4f).

Again, if there are issues with any of these test patterns, you'll need to set a Total Ink Limit or return to the Individual Channel Ink Reduction step to apply stronger reductions. If you choose to set a Total Ink Limit, return to the Color Transforms screen (Illustration 2a). Above the Halftone Properties on the right side, you'll see the Ink Limit (Total Percent) box. Enter the percent of your Total Ink Limit, click OK to exit the Imaging Configuration screen, and save your "unlinearized" IC. Click OK to exit the Color Transforms screen, click OK to exit the Imaging Configuration screen, and save your "unlinearized" IC.

NOTE:

If you have set a Total Ink Limit, all patches above the percent set will be identical. For example, if you set your Ink Limit (total percent) to 325%, you will see that the patches for 325, 350, 375, and 400 all look the same.

NOTE:

Be aware of the amount of drying time needed before the patches can be handled in this step because this may imply that you should do further ink limiting. This is an individual preference and is determined by what drying time would be acceptable in a production environment.

NOTE:

If your spectrophotometer is the DTP20 or the Eyeone, the test file already contains the linearization pattern and does not need to be printed again.

Step 5: Test Print

Reprint your test file ("generalTest018eyeone.ps" or "generalTest018dtp20.ps") to check for any additional Individual Channel Ink Reductions or Total Ink Limits that may be required. All squares should have good retention, show no artifacts, and have no bleeding problems.

If you are still having ink retention issues, depending on the printer model, there are other options that can be used for limiting ink. For example, you can choose a different ink set (i.e. CMYK, CMYKLcLm, etc.), lower the resolution, or change to a dry mode (if available).

NOTE: If you make any changes to the setup configuration, you will need to restart the profiling from Step 1.

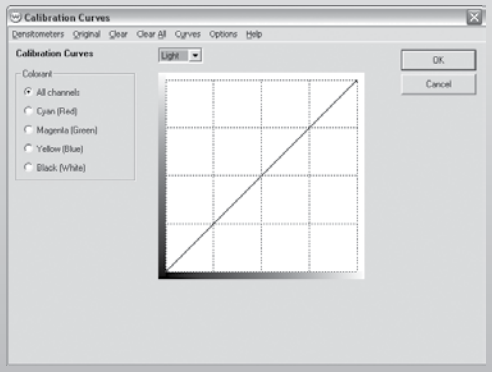

Illustration 6a: Calibration Curves screen

Step 6: Linearize (Calibrate) the Printer

Open the appropriate linearization file that matches your spectrophotometer and printing scenario, such as c:\wwrip\psfiles\DTP41.ps or c:\wwrip\psfiles\DTP32.ps. You can find more information on which file to use for your spectrophotometer in the Densitometers section of SoftRIP's online help.

RIP and Print the selected linearization test pattern.

Return to the Calibration screen (Illustration 4c) and click the Calibration Curves button to launch the Calibration Curves screen (Illustration 6a).

Use the "Options" menu on this screen to choose between performing

a density linearization (default) and a dot linearization. Your choice should be driven by your output type and, more importantly, by the expectations of your ICC profiling software. You may need to test each setting to determine which provides best results with your profiling package.

Select your densitometry hardware from the "Densitometers" menu. You will receive device-specific instructions for reading the linearization patches. Once you have followed the on-screen instructions and have read the test patterns/strips, click OK to exit.

You will see the resulting data in the Calibration Curves display, which will look similar to the curves shown in Illustration 6b. Click on OK as many times as is necessary to return to the Imaging Configuration screen.

You must exit all screens by clicking OK, instead of Cancel, or your data will be lost.

When you click OK on the Imaging Configuration screen, you will be asked to save your Configuration. Name your Configuration so that it is identified as your original linearization data.

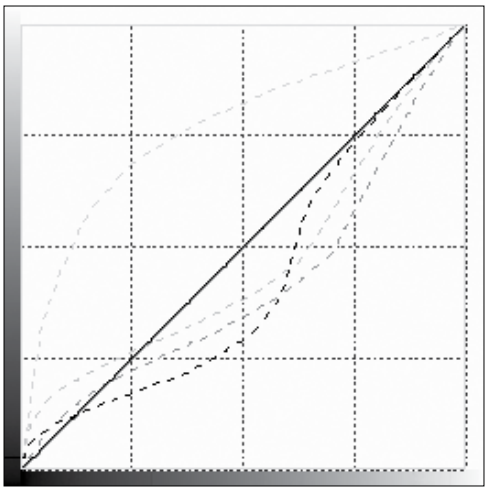

Illustration 6b: Calibration Curves display

Step 7: Confirm Linearization

Reprint the same linearization test pattern from Step 6 using your new Imaging Configuration. If you used one of the "generalTest018" files, you can reprint it again. By reading these new patches, you can double check your linearization to ensure that your original data is good.

Open the Calibration Curves screen. Use the "Options" menu to select the same linearization type used in the original linearization. Select your hardware from the "Densitometers" menu again and follow the steps to read the linearization patches.

When asked if you want to overwrite or add the new curves to the linearization, choose "Yes."

Now the curves shown in the Calibration Curves display should look nearly linear (straight on the diagonal). If your curves look linear, as shown in Illustration 7a, you need to use the Cancel button to back out of all screens and return to the main screen.

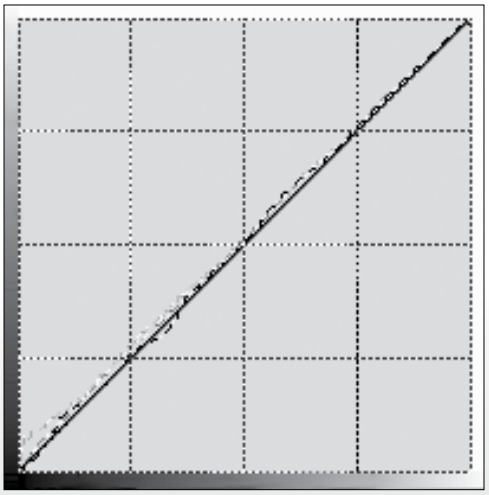

Illustration 7a: Confirm linearization in the Calibration Curves screen

NOTE: Do not use the OK button. It is very important that you use Cancel to exit; if you use OK, you will write over your data and invalidate the linearization.

If your curves do not look linear, have large bumps, or fall sharply away from the center line, you'll need to perform a new linearization. To do this, you must first clear out your linearization curves by using "Clear All" from the top menu.

Use OK to back out of the Calibration, Color Transforms, and Imaging Configuration screens and resave your Imaging Configuration with a new name (such as Linearization_Second_Attempt) and click OK to save.

Return to Step 6 to perform a new linearization and repeat the steps to confirm linearization. If the curves still have bumps or fall away from the centerline after the second confirmation, you should reconsider your Total Ink Limit and Individual Channel Ink Reduction settings. You may want to speak with a Wasatch technician for guidance.

Step 8: Print Profile Target

The profiling software (such as Monaco or ColorBlind) you are using will provide a standard set of patches that will need to be printed through SoftRIP and read with your spectrophotometer.

Open the file provided by your profiling software in SoftRIP. Now, with your newly created linearized Imaging Configuration applied, RIP and Print the file.

Allow the patches to dry (if necessary) and scan the patches into your profiling software. Save the generated ICC or ICM file to a location you can easily browse for importing into SoftRIP.

NOTE: If you are working in a HiFi print mode and your profiling software applies a curve to the Spot Colors, we recommend that you modify the default curve so that it is linear for each Spot Color.

Step 9: Import Profile

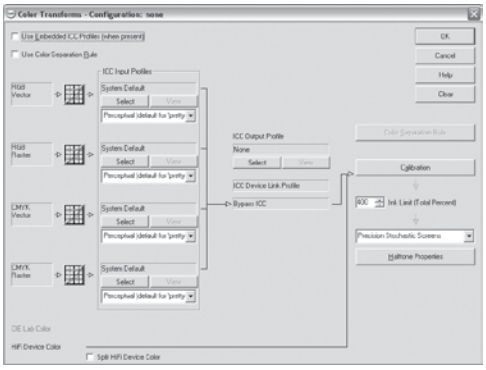

Illustration 9a: Color Transforms screen (Print>Setup>Edit>Color Transforms)

Once the profile has been generated from the profiling software, you can import it into SoftRIP and match it to the linearization by accessing the Color Transforms screen (Illustration 9a).

In the middle section, you'll see the "Output ICC Profile" section. It should still show "None" as the profile. Browse for the correct "ICM" or "ICC" file in the directory where you saved the profile from your profiling software. The arrows on the Color Transform screen should turn green, indicating that the color workflow is working correctly with an output profile in place.

Click OK until you get to the "Save As" screen. At this point, you want to save the Imaging Configuration under the final name you want your profile to have. We recommend using the "Resolution_Inkset_Media" naming convention, to make it easy to find the Imaging Configuration later. When you click OK, your configuration will be saved. Your new Imaging Configuration can now be accessed from the Imaging Configuration pull-down menu on the Setup screen.

Step 10: Print Profile Test

Illustration 10a: Profile test

With your new profile, you may want to print a test file. Wasatch does not supply a file for you to use, but we suggest you create one internally as a final standardized testing procedure.

This test file should be one in which the original color is standardized. We recommend that you DO NOT use a customer file or a random color file as it will be difficult to locate color issues in these types of files. Rather, Wasatch recommends that you print a standard image you are familiar with. It should have primary colors, secondary colors, and an image with details like faces, shadows, etc. It should also have both CMYK and RGB components (Illustration 10a).

Be sure that all of your color and printer settings are consistent with the settings you used when your profile was generated. RIP and Print your test image.

Analyze the print for quality assurance in order to determine whether your new profile should pass or fail. Things to check for include: posterization, lizarding effects, turtling effects, bleeding, banding, patterns introduced by process, and any other abnormalities. Also check the final print for saturation and overall color. Keeping in mind that

different substrates (media) will look different, it is reasonable to ask, "Is this expected behavior for the media and resolution?"

Step 11: Distribution (optional)

If you intend to distribute profiles, you must be in accordance with the copyright statement of your profiling software.

We recommend that you distribute your new Imaging Configurations using our automatic installer. In order to work with the Wasatch installer, you must gather all of the files associated with the new Imaging Configuration into a folder that is called "configurations" (case sensitive).

We recommend you put your working "configurations" folder in a temporary location for gathering the files, such as c:\temp\configurations.

Go to c:\wwrip\configurations and find the folder with the name of the printer model used in your profile (Illustration 11a). There are separate folders for each of that printer's installed Imaging Configurations within the printer folder (Illustration 11b).

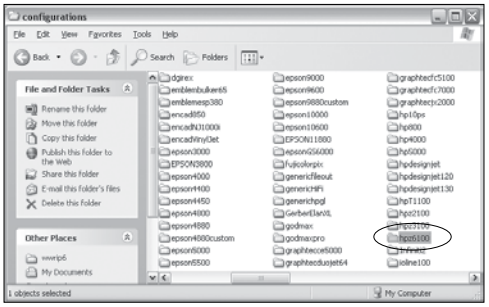

Illustration 11a: Your c:\wwrip\configurations folder will look something like this

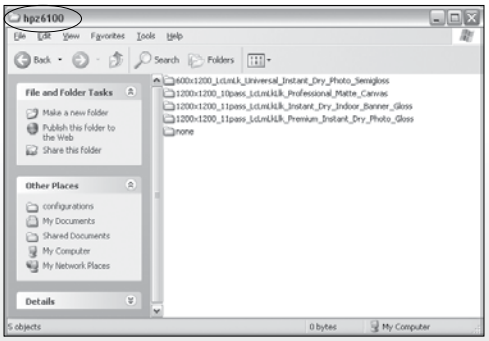

Illustration 11b: Imaging Configurations within your chosen printer folder

For distribution, you need your new profile to be in a folder named precisely like this printer's folder (case sensitive, all spaces included, etc.). For this reason, we recommend that you copy the entire folder named for that printer over to your temporary "configurations" folder and then delete all the imaging configuration sub-folders other than the one you wish to distribute from the temporary location.

You can find the automatic installation tool on the Imaging Configuration CDs provided with SoftRIP. From the CD, copy "Install.exe" and the "Autorun.inf" informational text file to your temporary folder.

NOTE: The files "Autorun.inf" and "Install.exe" should be one level down from the configurations folder. Now you can email or burn the new configurations to CD for distribution.

At the distribution site, the customer can launch "Install.exe" by double clicking the file. If distributing by CD, the "Autorun.inf" file will automatically launch the installer when the customer inserts the CD. The installer will ask for the location to copy the Imaging Configuration(s) to. The primary wwrip folder should be selected (such as c:\wwrip).

The installer will list all Imaging Configurations, by printer, that are in its same "configurations" folder. To install, a user only needs to check the boxes for the desired profiles. A confirmation message will be shown with the number of profiles installed. Here, the customer can Click OK and Exit.

Your new profile will now appear in the user's copy of SoftRIP. When the appropriate printer is selected in the setup screen, the new Imaging Configuration will appear along with others loaded in the Imaging Configuration window.