Kodak Inkjet Proofing Solutions: Achieving Color-Accurate Proofs

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Table of Contents

This discussion paper explores the challenges associated with making color-accurate proofs and describes how **Kodak** Inkjet Proofers overcome them. It covers proofing environment, proofing media, media configurations, calibration, spectrophotometers, the **Kodak** Certified Processes, workflow software, black text reproduction, and color target strategies.

The Need for Color-Accurate Proofs

A color-accurate proof allows a job to go to press. Color accuracy is critical because the proof is relied upon to communicate the color expectation between the printer and the print buyer. Inaccurate proofs that can't be achieved on press can result in costly remakes and dissatisfied customers.

This paper highlights the important factors that affect the color accuracy of a proof and impact whether the printer will be able to consistently and accurately reproduce the color that is produced on the proof. It also overviews how **Kodak** Inkjet Proofing Solutions help you achieve the desired results.

Proofing Environment

The first important factor is the environment within which the proof is produced. Temperature and humidity affect how ink is absorbed into paper and how quickly the ink dries, both of which can affect how the inks interact on the paper, and ultimately the way the color is produced on the proof. A temperature-controlled environment removes these fluctuations.

Choice of Media

For the best visual color simulation of a press target, choose a proofing media that reflects the amount of brighteners used in the press paper. Brighteners are added to media to make it appear whiter and to increase the range of colors the media and ink can produce.

You can identify the level of media brighteners two ways. One way is to view the proofing media and press paper under black light. For example, compare the sample book of **Kodak** Inkjet Proofing Media with your press paper under black light to find which proofing media best resembles the amount of brighteners used in the press paper. A second way is to measure the proofing media and press paper with a spectrophotometer. Measure each proofing media and press paper twice: once with an ultraviolet (UV) filter and once with a U (unfiltered) filter. The difference between the UV-filtered and unfiltered measurements identifies the amount of brightener.

Tip: If you run paper type 1 on your press, use **Kodak Matchprint** Pro PressWhite or SuperWhite Media.

Optimized Media Configurations

Kodak tests and evaluates how **Kodak** Media perform on **Kodak** Inkjet Proofers, and we use the test results to create media configurations that control ink volume, offer superb gray balance, help ensure linear output of CMYK inks, and control the gamut. Media configurations also define the absolute baseline target numbers used to calibrate the media on the device. All of this testing allows Kodak to provide media configurations for each combination of proofer, resolution, media, ink, and spectrophotometer that we support, providing the best proofing solution for the media we sell.

One-Step Calibration

A calibrated proofer consistently prints the same color. It's important to note the difference between calibration and color management. Whereas calibration is required to ensure that the inkjet proofer consistently prints color on a specific combination of media and ink, color management uses ICC profiles and/or DeviceLink ICC profiles to simulate a target color space. When used with workflow software that supports ICC profiles, they translate color output from one device to another.

Successful color management requires reliable calibration. With unstable calibration, color management may miss its target due to the fluctuating color characteristics of the target or source color condition. Kodak provides fast, accurate, one-step calibration that uses the absolute baseline target numbers included in the media configurations. The absolute baseline technology combined with an algorithm requires a

calibration target with only 81 patches to quickly and accurately calibrate the inkjet proofer once. Compare this to other proofing systems that use targets with hundreds of patches, which take much longer to print and measure.

Once calibrated, **Kodak** Inkjet Proofers let you periodically check the calibration to ensure it remains within tolerance. Again, because of the absolute baseline technology, the target used to check calibration requires only 26 patches. How often you check calibration depends on your desired level of process control. Only when the inkjet proofer fails the calibration check do you need to recalibrate the device.

The ability to check the calibration is particularly powerful when you have an inkjet proofer calibrated for one media and setup to simulate three different color targets. You only need to check the calibration for the proofer, not each setup, to ensure that the device remains calibrated and can continue to consistently simulate all three color targets.

Support for a Variety of Spectrophotometers

Kodak supports the following spectrophotometers with ultraviolet (UV) filters for inkjet proofing:

- **GretagMacbeth Eye-One** Spectrophotometer
- **GretagMacbeth Spectrolino** Spectrophotometer
- **X-Rite** DTP41 Spectrophotometer
- Inline spectrophotometer with the **Kodak Veris** Digital Proofer
- Inline spectrophotometer with the **Hewlett-Packard DesignJet** Z2100 Photo Printer

Spectrophotometers measure color by taking spectral readings of color wavelengths. Kodak supports spectrophotometers with UV filters because they offer the most consistent readings of color by eliminating the effects of media brighteners. For more information, contact your local sales representative to receive the white papers on Color Measurement with a UV Filter and Color Measurement for Profiling with PressWhite Papers.

Each type of spectrophotometer interprets spectral data slightly differently, even different models of the same spectrophotometer. For this reason, Kodak provides media configurations optimized for its supported spectrophotometers. The media configurations allow the best visual color simulation and the numerical accuracy of the absolute baseline technology.

Tip: Use the same spectrophotometer for calibration, and check calibrations when you have more than one **Kodak** Proofing Device. This helps ensure quality control when load balancing between devices. Also use the same spectrophotometer to measure proofs generated by different devices (this does not apply to inline spectrophotometers).

Spectrophotometer measurements are also affected by ink drying time. Different ink drying times can produce different spectrophotometer measurements. For the best color measurements, establish an ink drying time standard, and wait the specified amount of time before measuring proofs.

Several **Kodak** Inkjet Proofers have a spectrophotometer attached to the print head. These are called inline spectrophotometers, and they offer several advantages. Inline spectrophotometers automate the measurement process, removing proof handling errors from the measurement process and keeping your hands free to do other tasks. They also offer consistent color readings because the inline spectrophotometers always wait the same amount of time for the ink to dry before measuring the color bar at exactly the same angle and speed. Even though each inkjet proofer uses a different spectrophotometer, the consistency of the color measurements overrides any measurement differences between the inline spectrophotometers.

Certified Process for Proofing

The **Kodak** Certified Process for Proofing provides assurance that the correct elements were used to output a proof. It helps ensure that the:

- Media and ink are correct
- Profile is signed and correct for the media
- Proofer calibration is valid

With the Certified Process for Proofing, you can prevent incorrect output due to an incorrect setup. For example, you can avoid outputting a proof when the wrong profile is selected for the media, which saves you time and money. The Certified Process for Proofing is particularly useful for shops that use multiple types of media.

Certified Process for Color Confirmation

The Certified Process for Color Confirmation provides process control and confirms that the color of the proof is within a specified tolerance. It helps ensure that the:

- Profile is signed and correct for media
- Proofer calibration is valid
- Measured color falls within the specified tolerance

You can customize the Certified Process for Color Confirmation by using your own color bar.

Full Integration with **Kodak** Workflow Software

Use the same RIP for plating and proofing to help ensure that files are interpreted consistently. **Kodak Prinergy** or **Kodak Prinergy Evo** Workflow Software offer direct connectivity to **Kodak** Inkjet Proofers, and uses the same RIP to process and color manage files for plating and proofing. **Kodak** Workflow Software uses a combination of ICC profiles, DeviceLink ICC profiles, and **PANTONE** Color Libraries to color manage proofs and simulate spot colors.

For third-party workflows, we recommend sending raster files (for example, raster TIFF files) to the inkjet proofer. You can also send vector files. However, vector files introduce the opportunity for error because different workflow software can produce slightly different interpretations of vector files. Verify the correct setup for processing vector files before using them as your workflow standard. With third-party workflows, you must also decide where you want to color manage proofs.

Exceptional Black Text Reproduction

Inkjet proofers use combinations of CMYK ink to print black text, while profiles control the color. The type of profile can affect black text reproduction. For example, when you use a pair of ICC profiles, overprints of CMYK inks generate black text. If the ink nozzles are misaligned, the inks may print slightly beside each other instead of on top of each other, making text look fuzzy.

In contrast, when you use a DeviceLink ICC profile, also known as 4D technology, you can better control the generation of black text. DeviceLink ICC profiles can be configured to use more black ink and less of the CMY inks to print black text, producing text with a rich black color and crisp edges. The text is less likely to look fuzzy because fewer inks overprint to create the text and the opportunity for misaligned nozzles lessen.

Kodak Inkjet Proofers and workflow software support 4D technology.

Define and Achieve Color Targets

The first step towards establishing a color target that your proofs can simulate is to choose a good target. The target can be printed using an inkjet proofer, analog halftone proofer, digital halftone proofer, or press. Regardless of the device used to generate the target, ensure that the color is consistent across the target and that it represents how the device prints on a regular basis.

For example, if your target is a press sheet, ensure that that it represents the center of the press printing range. Avoid using a press target that the press struggles to reproduce on a regular basis. Kodak offers Professional Services to help you characterize your press. For more information, contact your sales representative. See also the Targeting and Aligning Presswork and Proof White Paper.

When properly calibrated, halftone proofers generate good targets. Manufacturers of halftone media have put much effort into ensuring that the media simulates press inks. It is much less costly to characterize a halftone proofer compared to a press. With the use of ICC profiles and/or DeviceLink ICC profiles, a properly calibrated inkjet proofer can also simulate a color target generated by halftone proofers or another device.

With a target identified, the next step is to select a proofing media that can reproduce the gamut of the target media as well as possible. Consider the tint and brighteners used in the proofing and target media.

With a proofing media and target selected, you now need to select profiling software. Profiling software generates the ICC profiles and DeviceLink ICC profiles that your inkjet proofer uses to simulate color. Select profiling software that supports the open International Color

Consortium (ICC) standard and that generates ICC profiles and DeviceLink ICC profiles. Kodak recommends DeviceLink ICC profiles for inkjet proofing because of how they reproduce black text. **Kodak Profile Wizard Mio** Color Management Software meets all of these requirements.

Kodak Color Services

For additional support with profiling, Kodak offers the following color services for inkjet proofers:

- On-Site CMYK Profiling
- On-Site **Profile Wizard** Software Training With On-Site CMYK Profiling
- Remote CMYK Profiling

The color services provide you with a customized profile for your inkjet proofer and **Kodak** Media to help you simulate your proofing target.

To learn more about it...

To learn more about **Kodak** Inkjet Proofing Solutions, please contact your local sales representative.

Glossary

Brighteners: Manufacturers add fluorescent material to paper to make it appear brighter and to increase the range of colors the paper and ink can produce. Fluorescent materials have the unique ability to absorb invisible ultraviolet light and emit the light into the visible region, which is why the paper appears brighter.

Gamut: The entire range of colors that can be produced by a print condition. A color gamut contains a finite, contiguous volume in the three-dimensional space representing color.

ICC: The purpose of the ICC (International Color Consortium) is to promote the use and adoption of open, vendor-neutral, cross-platform color management systems. The ICC encourages vendors to support the ICC profile format and the workflows required to use ICC profiles. For more information, visit http://www.color.org/.

ICC profiles: A color space description that acts as a standard for accurate reproduction of colors across different platforms, devices, and applications. ICC profiles work in pairs. For inkjet proofing, one ICC profile defines the color space of the inkjet proofer and another ICC profile defines the target you want to simulate. A DeviceLink ICC profile contains both the proofer and target color space in one file.

Spectrophotometers: An instrument that takes spectral readings of color wavelengths from a color sample. Hand-held models are used to manually measure color, and inline models are attached to the proofing device and automatically measure color.