

Test Targets Showcase: Digital Photography to Print

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Objectives

This is a study to illustrate how ICC color management can be applied from digital photography to print. It makes sense that we also compare the difference in image quality between an ICC-based workflow and a legacy-based workflow.

Procedures

1. Digital photography

Two Kimberly-Clark paintings were captured by a Nikon D1X digital camera (figure 1) with indoor strobe lighting.



Figure 1. The 5.3 megapixel Nikon D1X digital SLR camera.

2. Digital camera profiling

A Macbeth ColorChecker was photographed along with the paintings and the Nikon ICC profile was built with the use of Kodak ColorFlow ProfileEditor (v2.2.1).

3. Image cropping and resizing

The raw image was opened in Photoshop 6.0 without color management. It was cropped and resized so that the image is 3.5" wide with a spatial resolution of 300 ppi.

4. Legacy-based color workflow

The color settings in the legacy-based workflow is represented by the U.S. Prepress Defaults (figure 2). The cropped image was converted via mode change to SWOP CMYK. By doing so, neither

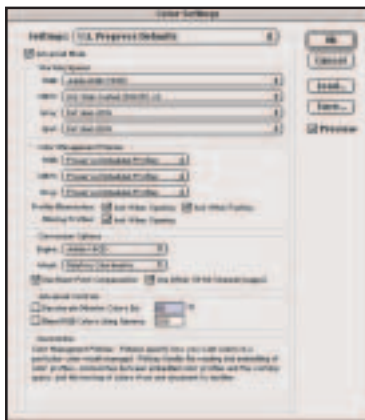


Figure 2. The U. S. Prepress Defaults recognizes the Adobe RGB (1998) as the RGB working space and the U.S. Web Coated (SWOP) as the CMYK working space. The CMM is defaulted to Adobe (ACE) and the rendering intent is set to relative colorimetric.

the camera color space nor the printer color space were accounted for in the color conversion.

5. ICC-based color workflow

The color settings in the ICC-based workflow is shown in figure 3. First, the cropped image was opened in Photoshop 6.0 by assigning the Nikon ICC profile to the raw data and converted to the ColorMatch RGB working space. This provided the appearance match between the original painting and the monitor display. The second step was to convert the image from the ColorMatch RGB space to the Indigo UltraStream CMYK space via the "Convert to Profile." The Kodak CMM and perceptual rendering were used in the conversion.

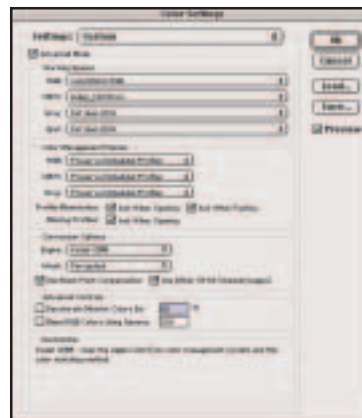


Figure 3. In the ICC workflow, ColorMatch RGB was used as the RGB working space and Indigo UltraStream 2000 was used as the CMYK working space in Photoshop 6.0 color settings.

6. Pagination

The pagination was implemented in Quark 4.0. The paintings, rendered by the ICC method, are placed at left (Figure 4). The images, rendered by the legacy method, are shown at right (Figure 5).

7. Hardcopy output

The page was printed to Indigo UltraStream 2000. It is important that the printing conditions, i.e., RIP, press, paper, and toners, all adhered to a known condition where the printer ICC profile was generated from.

8. Visual assessment

When comparing against the original paintings, images rendered by the ICC method show better agreement than the legacy method.



Figure 4. Digital photography to print via the ICC workflow.

Figure 5. Digital photography to print via a legacy workflow.

Discussion

The Kimberly-Clark original paintings were used as subjects to study color image reproduction from digital photography to print. The original oil paintings were commissioned by Kimberly-Clark Corporation to depict “high points in man’s long history of developing methods for communicating written words” (Kimberly-Clark Corp., 1971.) Two paintings, Papermaking at Fabriano and The Roman Alphabet, by the same artist, Douglas M. Parrish, portray a wide range of tonality and color. They are excellent sources of images for reproduction quality assessment.

In digital imaging workflow, it’s strategic that we account for device-dependent variables prior to addressing image-dependent adjustments. In this case study, both the color sensitivity of the Nikon DX1 digital camera and the color rendering capabilities of the Indigo UltraStream 2000 digital press were accounted for in the ICC-based workflow. The color managed

reproduction agree very well with the original paintings whereby the legacy-based workflow did not.

It is highly desirable that color managed RGB images are converted to other output devices via Photoshop 6.0 API where the consistency of color image rendering can be witnessed. This would be an important objective as the Test Targets project continues.

Reference

Graphic Communications Through the Ages, Kimberly-Clark Corp., 1971.

Print•RIT Test Forms used in this study:

