

The Important Roles of Inks and Media in the Light Fading Stability of Inkjet Prints

Henry Wilhelm
Wilhelm Imaging Research, Inc.
Grinnell, Iowa U.S.A.

Joseph Holmes
Imaging and Color Management Consultant
Kensington, California U.S.A.

Mark McCormick-Goodhart
Old Town Editions
Alexandria, Virginia U.S.A.

Abstract

In the fine art field, the high-resolution inkjet printers made by IRIS Graphics, Inc. have for more than 7 years remained the preferred direct digital output device for printing large format color images. IRIS printers can produce precisely controlled, near-continuous-tone color images on a wide variety of substrates. IRIS prints can be made with almost every type of paper (including heavyweight artists' watercolor paper having a variety of surface textures), coated polyester or other plastic sheets, photographic-type papers, cloth, and most other materials that will accept water-based inks. Prints may be produced in sizes up to 34 x 46 inches and the printers lend themselves to small-to-moderate volume "print-on-demand" limited edition publishing. All of these factors have contributed to the appeal of IRIS printers among photographers and artists working with digitized photographic images in Adobe Photoshop, Live Picture, or other digital image processing programs, among "digital artists" who utilize computers to create their work, and among publishers who produce work for the fine art, home, and office decor markets.

IRIS printers were originally intended for direct digital proofing in the graphic arts field, and for computer-aided industrial design work. In most such applications, good light fading stability is not an important requirement; the inks that were originally supplied for IRIS printers had comparatively poor light fading stability characteristics, and the prints had a much shorter display life than that of traditional types of color

prints. (However, if made on a stable, non-yellowing print support material, the dark storage stability of the original types of inks is very good.) In the fine art field, however, where prints may be sold for many thousands of dollars and the longest possible display life is desired, new inks with much better light fading stability have been developed during the past several years.

In this presentation, the light fading characteristics of several recently introduced fine art ink sets for IRIS printers will be discussed. "Hybrid" ink sets which consist of inks selected from two or more standard ink sets supplied by the various manufacturers will also be described.

Also discussed will be the light fading stability of prints made with Hewlett-Packard, Epson, Canon, and Lexmark desktop inkjet printers. Potentially adverse intermixture effects between two or more inks (catalytic fading), the influence of different types of media on light fading stability, the importance of starting density in pictorial image stability tests, and the effects of ambient relative humidity on the stability characteristics of the prints will be discussed. The light fading stability of inkjet prints will be compared to that of current photographic color papers.

Keywords

Inkjet Prints, Light Fading Stability, Dark Fading Stability, Accelerated Tests, Adverse Ink Intermixture Effects, Catalytic Fading, Influence of Media on Light Fading Stability, Stability of Traditional Photographic Color Prints

Paper by Henry Wilhelm (Wilhelm Imaging Research, Inc.); Joseph Holmes (Imaging and Color Mangement Consultant); and Mark McCormick-Goodhart (Old Town Editions) entitled: "The Important Roles of Inks and Media in the Light Fading Stability of Inkjet Prints." Extended abstract appeared on page 122 in:

Final Program and Proceedings: IS&T's NIP14: International Conference on Digital Printing Technologies

ISBN: 0-89208-212-7

©1998 The Society for Imaging Science and Technology

October 18–23, 1998
Westin Harbour Castle Hotel
Toronto, Ontario, Canada

Published by:

IS&T: The Society for Imaging Science and Technology
7003 Kilworth Lane
Springfield, Virginia 22151 U.S.A.
Phone: 703-642-9090; Fax: 703-642-9094
www.imaging.org

Presentation Text Slides Follow.....

The Important Roles of Inks and Media in the Light-Fading Stability of Inkjet Prints

By

Henry Wilhelm (Wilhelm Imaging Research, Inc.)

Mark McCormick-Goodhart (Old Town Editions)

Joseph Holmes (Imaging and Color Management Consultant)

IS&T NIP14: Toronto, Ontario – October 20, 1998

Light-Fading Stability of Current Photographic Color Negative Prints

- Fujicolor Crystal Archive Paper 60 years*
- Kodak Ektacolor Edge 7 and Royal VII Papers 18 years
- Kodak Ektacolor Portra III Professional Paper 14 years
- Konica Color QA Paper Type A7 14 years*
- Agfacolor Paper Type 10 13 years

*Predictions integrated with manufacturer's Arrhenius dark storage data

Light-Fading Stability of Iris Inkjet Prints Made with the Iris “Equipoise” Inkset

- **Arches Cold Press watercolor paper** **32–36 years**
- **Somerset Velvet watercolor paper** **20–24 years**
- **UltraStable Canvas (glossy)** **18–22 years**
- **Iris Canvas (semi-matte)** **16–18 years**
- **Arches for Iris treated watercolor paper** **13–15 years**
- **Liege Inkjet Fine Art Paper** **2–3 years**

Light-Fading Stability of Prints Made with ENCAD Novajet Printer (300 dpi)

- **ENCAD GO pigmented inks on glossy paper** >150 years
- **ENCAD GA dye-based inks on glossy paper** 1–2 years
- **ENCAD GS dye-based inks on glossy paper** 1–2 years
- **Ilford Archiva dye-based inks on Ilfojet paper** 70–80 years
- **ENCAD GX dye-based inks on GX paper** not available

Light-Fading Stability of Prints Made with Epson Stylus Photo 700 Printer

- Fuji Super Photo Grade Inkjet Paper 3.3 years*
- Polaroid Premium Photographic Quality Paper 2.9 years*
- Mitsubishi Artist Mirror Gloss Heavy Paper 1.7 years
- Epson Photo Quality Glossy Film 1.7 years*
- Imation Photographic Quality Paper 1.5 years*
- Epson Photo Paper (glossy) 1.2 years
- Kodak Inkjet Photo Quality Paper (1997 type) 0.7 years*
- Konica Photo Quality Inkjet Paper QP 0.6 years*

* Potentially Serious High-RH related problems.....

Potentially Serious Paper and Ink-Specific Problems with Prints Subjected to Prolonged High-Humidity Conditions

- High-RH during the printing and drying phase
- High-RH (and temperature) during dark storage
- High-RH (and temperature) during display
 - Sticking and Ink Transfer
 - Ink Bleeding (lateral ink diffusion)
 - Density Change (increase or decrease)
 - Color Balance Changes
 - “Bronzing” in High Density Areas

Light-Fading Stability of Prints Made with HP, Canon, and Lexmark Printers

- HP 2000C w/HP Deluxe Photo Paper (HP/EK) 2.6 years*
- HP 722C w/HP Deluxe Photo Paper (HP/EK) 1.1 years*
- Lexmark 5700 w/Photo Inks and Lexmark Photo Paper 0.8 years
- Canon BJC-7000 w/Photo Inks and Canon Photo Paper 0.6 years

* Potentially Serious High-RH related problems.....

Longest-Lasting OEM Desktop Inkjet Photo Prints:

**Hewlett-Packard PhotoSmart Printer
with PhotoSmart Inks and HP
PhotoSmart Glossy or Matte
Photographic Paper (Only!)**

One Size Can't Fit All

—

**Media must be optimized for specific
inks and printers**

Light-Fading Stability of Prints Made with Epson Stylus Color 600 (4 ink) and Epson Stylus Photo 700 (6 ink)

- **Epson 600 with Epson Photo Paper (glossy) 1.9 years**
- **Epson 700 with Epson Photo Paper (glossy) 1.2 years**
- **Epson 600 with Photo Quality Glossy Film 3.7 years**
- **Epson 700 with Photo Quality Glossy Film 1.4 years**

Spectral Cut-Off and the Fading of Prints Made with Epson Stylus Photo 700 and Epson Photo Paper*

- **Bare-Bulb illumination** **0.9 years**
- **Glass-Filtered illumination** **1.2 years**
- **UV-Filtered illumination** **1.2 years**

* Philips Cool White fluorescent lamps

www.wilhelm-research.com