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TITLE:

Contemporary analog and digital color photographic prints: Dye and pigment print process descriptors, naming conventions, dating, and permanence characteristics

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POSTER SESSION

ABSTRACT:

Drawing on many years of research associated with *The Wilhelm Analog and Digital Color Print Materials Reference Collection – 1971 to 2014*, this paper describes the wide range of color print processes that comprise the modern era of color photography which began in 1935 with Kodak's introduction of Kodachrome transparency film and the companion Kodak Minicolor print process announced in 1941, both of which utilized images composed of cyan, magenta, and yellow dyes formed by a process known as chromogenic development using external couplers. These products were followed by a large number of color transparency and color negative film and print systems from Kodak, Agfa, Ansco, GAF, Fuji, Konica, 3M, Ferrania, and others. Photographers, galleries, and museums have variously referred to color prints made by these dye image processes as: Type C Prints; Type R Prints; Chromogenic Prints; Color Coupler Prints; Silver-Halide Prints; Lightjet Prints; Lambda Prints; Digital Type C Prints; Digital C Prints; Digital Chromogenic Prints; Duratrans; Digital Duratrans; and brand-associated names such as Ektacolor Prints; Kodak Prints; Crystal Archive Prints; Fujiflex Prints; Duraflex Prints; Endura Transparency Display Material; and so forth. In recent years, many of these print materials could be exposed with an enlarger or contact printed in an "analog" fashion, and the same print material could also be digitally imaged with scanning RGB laser or LED light sources (which can also produce monochrome images on color papers), further adding to the confusion about what the prints should properly be called. Face-mounting to acrylic sheet, lamination, and various types of print coatings have further complicated the naming situation.

Likewise, dye image prints made by the silver-dye-bleach process and dye-imbibition prints have been described using a variety of names, some brand-associated and some with names describing the image formation process.

Digital inkjet processes began entering the photography market in 1991, with dye image prints made on a wide variety of papers by Nash Editions and others using Iris Graphics Printers. A few years later, affordable desktop and large-format inkjet printers were introduced by Epson, Hewlett-Packard, and Canon, which were soon followed by Brother, Kodak, Agfa, HP-Scitex, Mutoh, Mimaki, Roland, EFI-Vutek, Durst, swissQprint, Canon-Oce, Fuji, Noritsu, and other manufacturers. Inkjet printers with improved stability pigment inks came into the market in 1998 and by 2006 most professional and fine art photographic prints were being made with pigment inks, often with printers utilizing six, eight, ten, or even twelve inks. Water-base aqueous pigment inks were later supplemented by solvent-based inks, UV-curable inks, dye-sublimation inks (used with a transfer process for both

prints on fabrics and on treated aluminum-base “Metal Prints”), and aqueous Latex inks. Unlike earlier color print processes, inkjet prints can be made on a very wide variety of substrates, including cotton-fiber fine art papers, RC photo-base papers, plastic supports, and fabrics. UV-curable ink prints can be made with rigid panels, including large sheets of acrylic plastic, aluminum, glass, plywood, and other materials.

In part because the inks and supports used to make inkjet prints are supplied as separate parts of the printmaking process, there are essentially an unlimited number of combinations of inks and supports, which has in turn greatly complicated the description, dating, and naming of these prints.

This paper proposes a simplified list of process descriptions and naming conventions that reconcile usage by photographers, museums and galleries, and the manufacturing industries. The proposed naming conventions distinguish between prints with images made with dyes and those made with pigments. Lists of non-recommended (but commonly used) names are also given. The permanence characteristics of the various processes and guidelines for their preservation are discussed.

AUTHOR BIOGRAPHY:

Henry Wilhelm is co-founder (with Carol Brower Wilhelm) and director of research at Wilhelm Imaging Research, Inc. (WIR) established in 1995 and co-founder (with Carol Brower Wilhelm and Harold Fuson) of The Center for the Image established in 2010. WIR test methods have become the worldwide de facto standard for print permanence evaluation and are currently being used by HP, Canon, Epson, and other OEMs. WIR also provides consulting services to museums, archives, and commercial collections on sub-zero cold storage for the very long-term preservation of still photographs and motion pictures. Wilhelm has authored or co-authored more than 25 technical papers that were presented at conferences sponsored by the Society for Imaging Science and Technology (IS&T) and the Imaging Society of Japan (ISJ) in the United States, Europe, and Japan. Wilhelm was one of the founding members of American National Standards Institute (ANSI) Committee IT-3, which was established in 1978, and now known as ISO Working Group 5/Task Group 3 of ISO Technical Committee 42. Together with Yoshihiko Shibahara of Fuji Photo Film Ltd. In Japan, he serves as co-chair of the Indoor Light Stability Test Methods Technical Subcommittee of ISO WG-5/TG-3. Wilhelm and Shibahara were co-project leaders for the development and writing of *ISO International Standard 18937:2014, Imaging Materials – Photographic Reflection Prints – Methods for Measuring Indoor Light Stability*. After 15 years of development, the 58-page standard was published by ISO in Geneva, Switzerland on February 1, 2014. With contributing author Carol Brower Wilhelm, he wrote *The Permanence and Care of Color Photographs: Traditional and Digital Color Prints, Color Negatives, Slides, and Motion Pictures*, published in 1993. The complete 758-page book is available in PDF/A format at no cost from <www.wilhelm-research.com>. Since the book was posted on the WIR website in 2003, more than one-half million copies have been downloaded worldwide. Wilhelm is the recipient of the Photoimaging Manufacturers and Distributors Association (PMDA) “2007 Lifetime Achievement Award” for his work on the evaluation of the permanence of traditional and digital color photographs. In 2011, he received an honorary Doctor of Science degree from Grinnell College.