New Pigmented Inks for High Image Quality Large Format Ink-Jet Printing

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Abstract

The large-format printer market can be divided into four segments: proof, sign graphics, fine art and photo. Each segment assigns a slightly different priority to the required properties — color gamut, image permanence, media flexibility, and printing speed for example. We have launched several new types of large-format printers that offer performance that will satisfy most users in all segments. These new large-format printers are equipped with a new type of pigment ink called EPSON UltraChrome™ ink. This report explains some of the technical features of this new type of ink.

Introduction

The discussion of what constitutes high-quality output from an ink-jet printer should not be limited to an analysis of such factors as the color development and the color reproduction range, the image resolution, and the size of ink droplets and image graininess. Rather, output should be evaluated in terms of overall printer capability. Not only should such factors as the quality of the gray balance, the degree of color twist, and the degree of color dependence on a light source (metamerism) be taken into account, but so should such factors as the length of time required for colors to stabilize after printing, the image permanence of the printout, and the flexibility with which a wide range of recording media can be accommodated.

To meet the many characteristics required for obtaining high-quality output with a large-format ink-jet printer (LFP), pigment ink provides advantages. For the LFPs that Epson released in 2000—the StylusPro-5500, 7500, and 9500—Seiko Epson developed EPSON UltraChrome™ ink, a pigment ink formulated by modifying and improving earlier EPSON ColorFast™ ink1. The characteristics of the newly developed EPSON UltraChrome™ ink are discussed below.

Features of EPSON UltraChrome™ Ink

EPSON UltraChrome™ ink features:
1. High color developing pigment
2. Optimized pigment particle diameter
3. Double the previous color pigment density
4. Use of light black ink
5. Use of matte black in which carbon black density tripled

1) Color Gamut

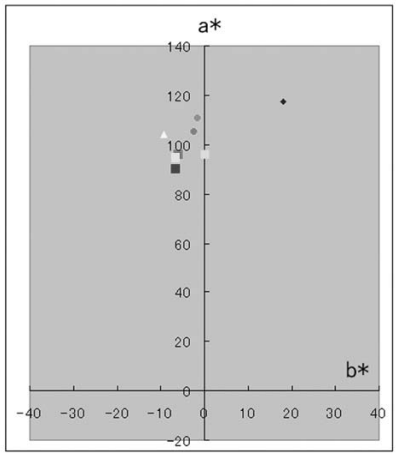

Figure 1. Differences in chroma according to type of yellow pigment.

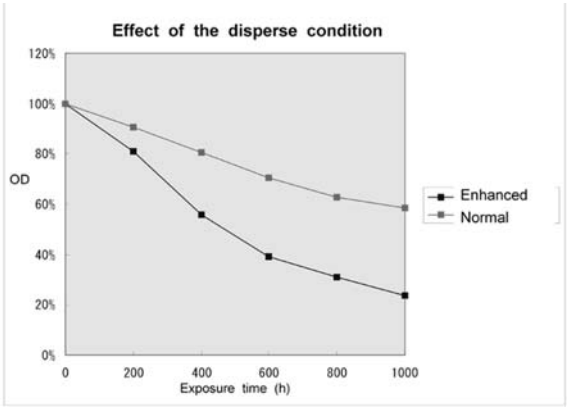

Figure 2. Differences in lightfastness according to P.Y.74 pigment particle diameter.

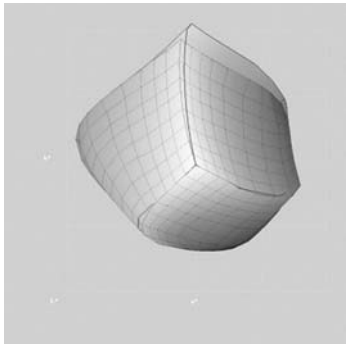

Figure 3. Comparison of EPSON ColorFast™ ink and UltraChrome™ ink color gamut

2) Gray Balance

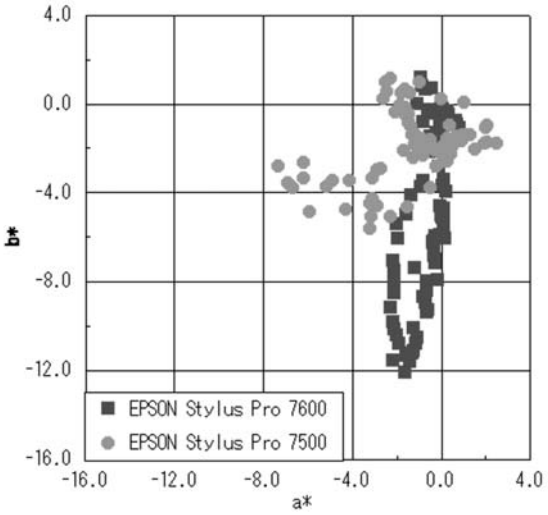

Figure 4. Comparison of EPSON ColorFast™ ink and Ultra-Chrome™ ink gray balance.

3) Metamerism

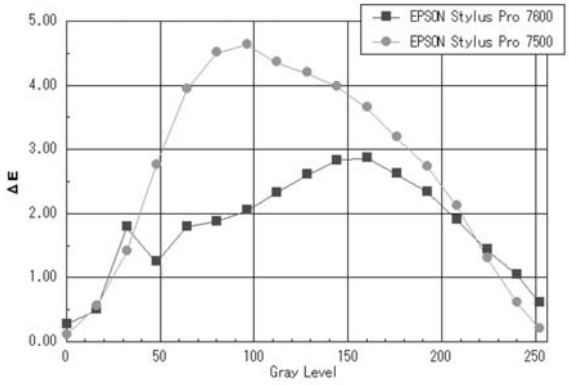

Figure 5. Comparison of EPSON ColorFast™ ink and Ultra-Chrome™ ink metamerism.

4) Short-Term Drift

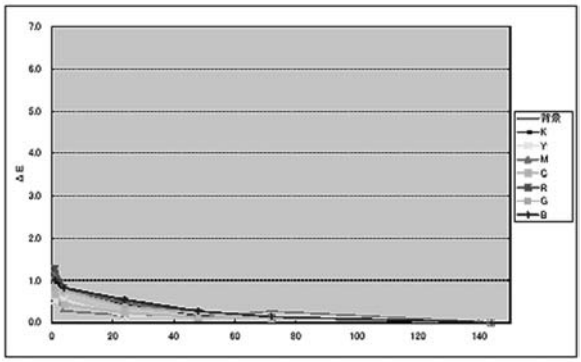

Figure 6. Short-term drift of EPSON UltraChrome™ ink.

5) Image Permanence

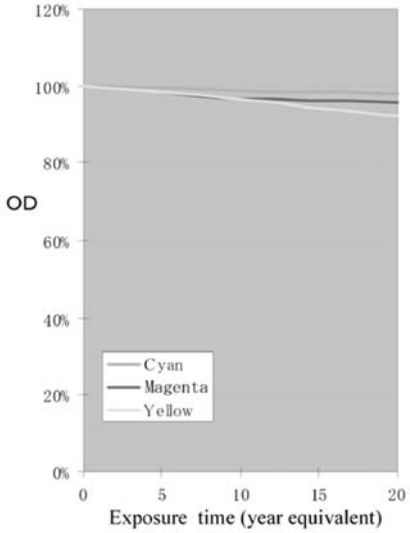

Figure 7. Lightfastness of EPSON UltraChrome™ ink

Conclusion

EPSON UltraChrome™ ink has been optimally designed for large-format printers used in a broad range of applications. This ink has the wide color reproduction range and small short-term drift demanded in the proof segment. It has the high image permanence demanded in the sign graphics segment. Moreover, it has the wide media flexibility sought in the fine art segment, as well as the neutral gray balance and minimal metamerism required in the photo segment.

References

1. Katsuhiko Iida, "EPSON Perfect Imaging System And New Colorfast Ink," Proceedings of IS&T's DPP2001, pg. 288-290.

Biography

Kiyohiko Takemoto is a manager in the TP Research & Development Dept. of Seiko Epson Corporation. He received a B.E. in science and engineering of applied chemistry from Waseda University, Japan, in 1985. Since joining Seiko Epson Corporation, Takemoto has developed a variety of key ink-jet device technologies, notably dye-based inks for EPSON Stylus™ color printers. His primary responsibilities are developing and designing pigment-based inks for EPSON Stylus™ photo printers.