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INFLUENCE OF THE DIFFERENCE ELECTRIC CHARGE ENERGY TRANSFER INK TO PAPER IN DIGITAL PRINTING

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Introduction



In digital printing mostly used electrophotography method, toner is transferred to the paper and then fused in place. The process of electrophotography involves the conversion picture data in the form of electrical impulses into a latent electrostatic field that is imprinted on a photoconductive dielectric material. Dry toner particles ink the latently charged image that is held on the photoreceptor before it is transferred to the paper either directly or through an intermediary belt. The process of inking is carried out by inking units, which use electric potential differences (electric fields) to non-contactly transfer the fine toner particles to the photoconductive drum, making the picture visible. By placing charged colorant particles on the field pattern, the latent picture is rendered visible and subsequently fixed to the pattern permanently.

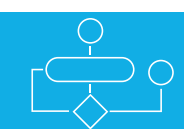
Problem Description



The charging system is to charge the light receiver evenly. The voltage from the charge is in the order of voltage levels to obtain an electric field strong enough to attract toner particles used in digital presses. The right amount of toner on paper can display color values that are close to ISO standards.

The manufacturers of digital printing, on the other hand, use their own brands with different properties and features, generally of electrophotography printing uses a direct-current electric field (DC) to transfer toner from an image transfer belt onto paper. New technology to use an alternating-current electric field (AC), which produces a condition that enables toner to transfer easily to the concave portion of the paper.

Methods



The printing substrate in this study was used coated paper with 250 g/m². The digital printing as Heidelberg Versafire EV, production of CMYK standard. The image quality is achieved to the resolution of 4,800 × 2,400 dpi. Enhanced toner transfer system for structured media (AC/DC) and controller by Prinect Digital Frontend (DFE). The parameter of experiment as five difference electrical charge energy (ECE) order the following conditions: ECE 1 (-10), ECE 2 (-5), ECE 3 (0), ECE 4 (+5) and ECE 5 (+10). After analyzed color of each color then adjust electric charge color for quality transfer.

The printing on substrate with test chart for ISO 12642-2 /ANSI IT8.7/4 random_S25 target, CMYK for i1Pro amount 1,617 patches.

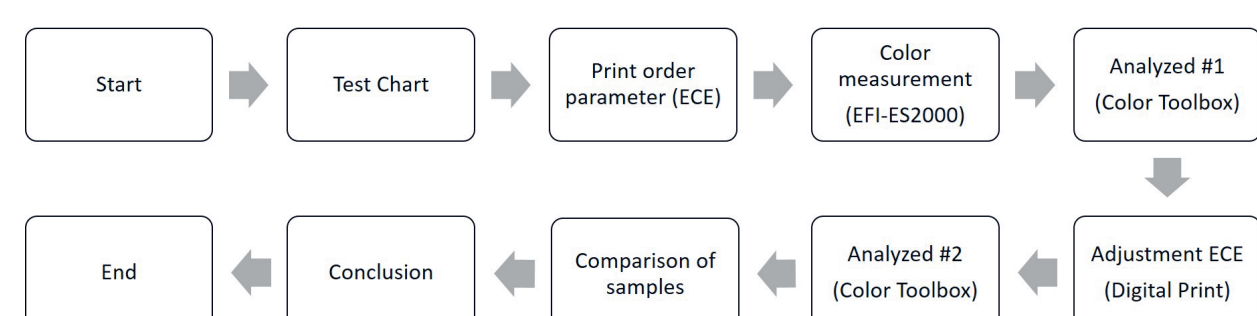


Figure 1

The process of experiment

Results



The samples were measured by spectrophotometer EFI ES-2000 Model i1Pro of each sample were performed by Prinect Color Toolbox 12.0 to obtained color value for comparison and created La/Lb diagram graphs of the color difference. And improve quality printed of color reproduction by adjust electric charge energy for quality transfer of ink.

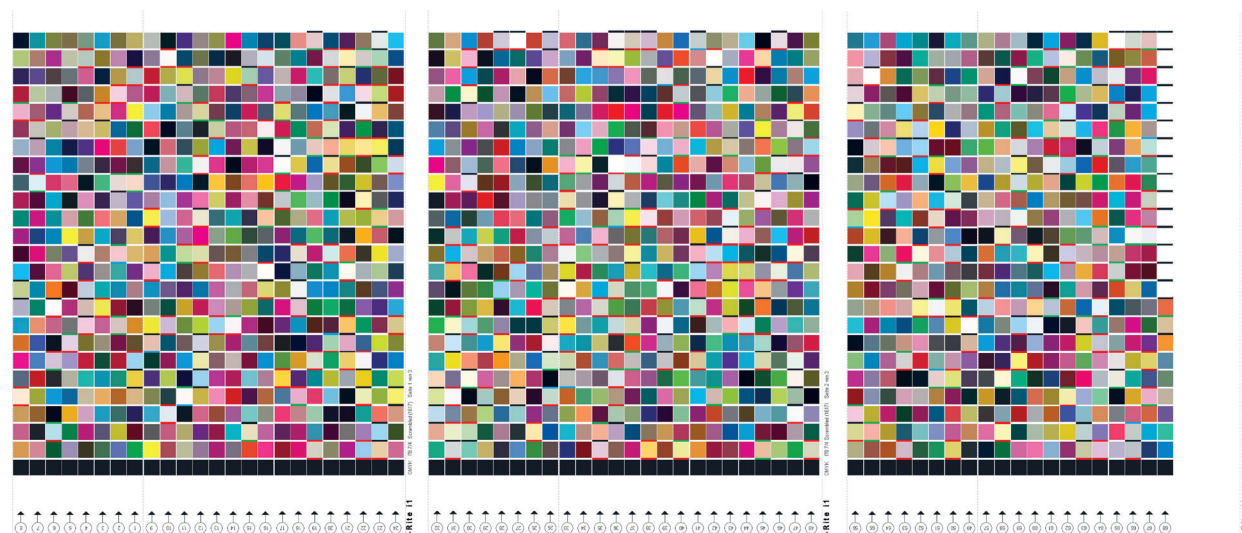


Figure 2

Test chart : IT8.7/4_Random_S25 for i1Pro.

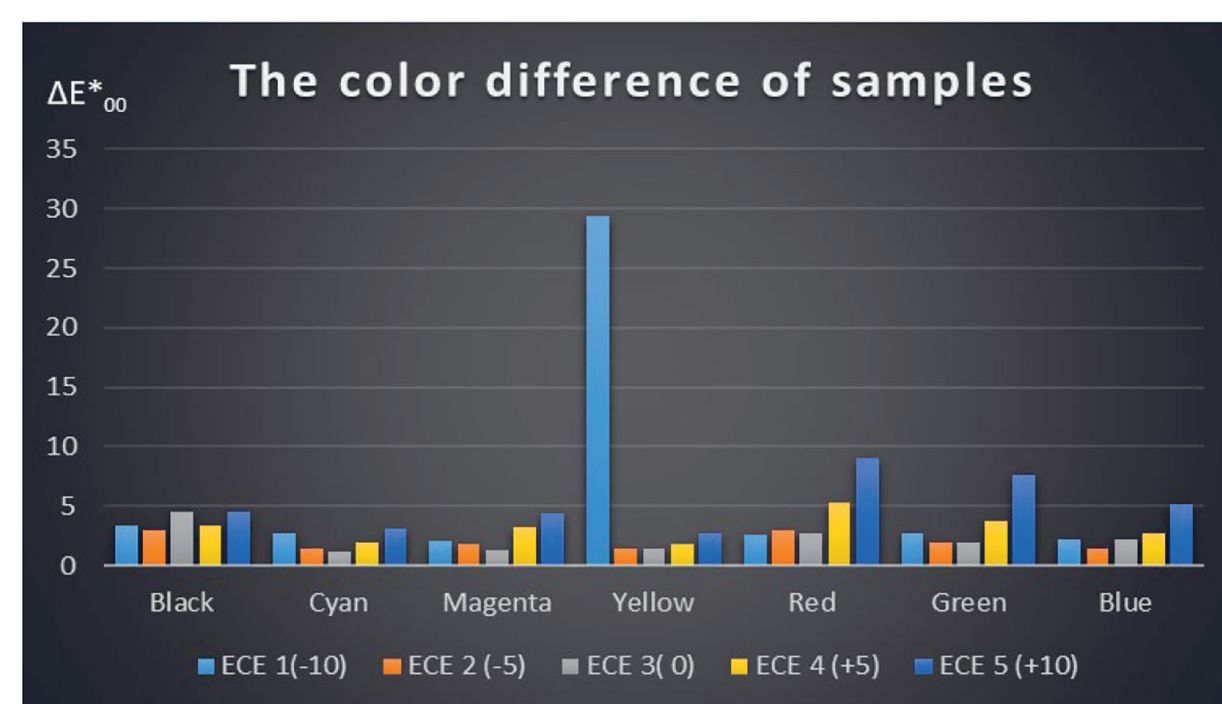


Figure 3

Compare for ΔE^*_{00} between HDMCoated and Samples.

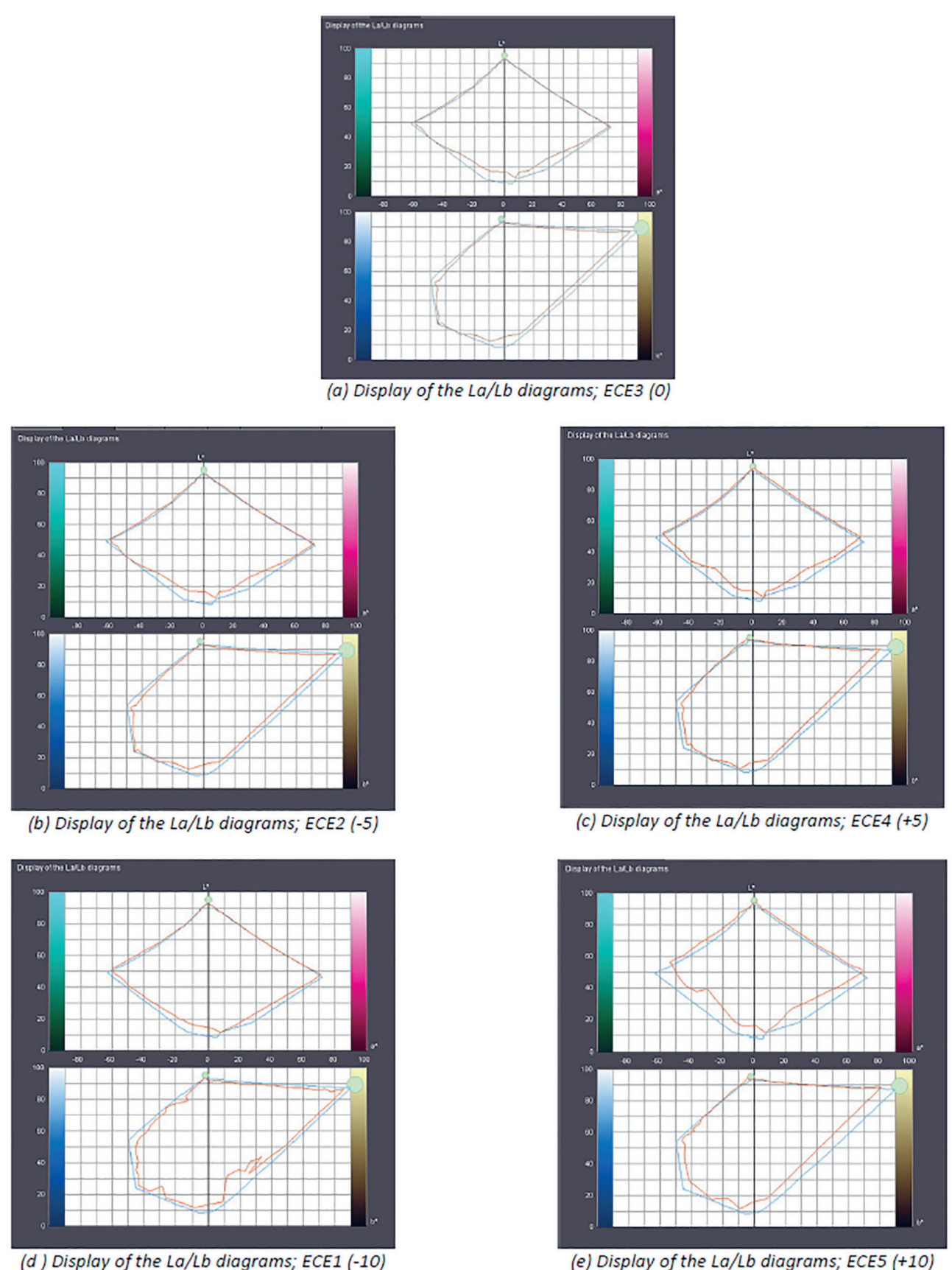


Figure 4

Compared the La/Lb diagrams and ΔE of each parameter (ECE)

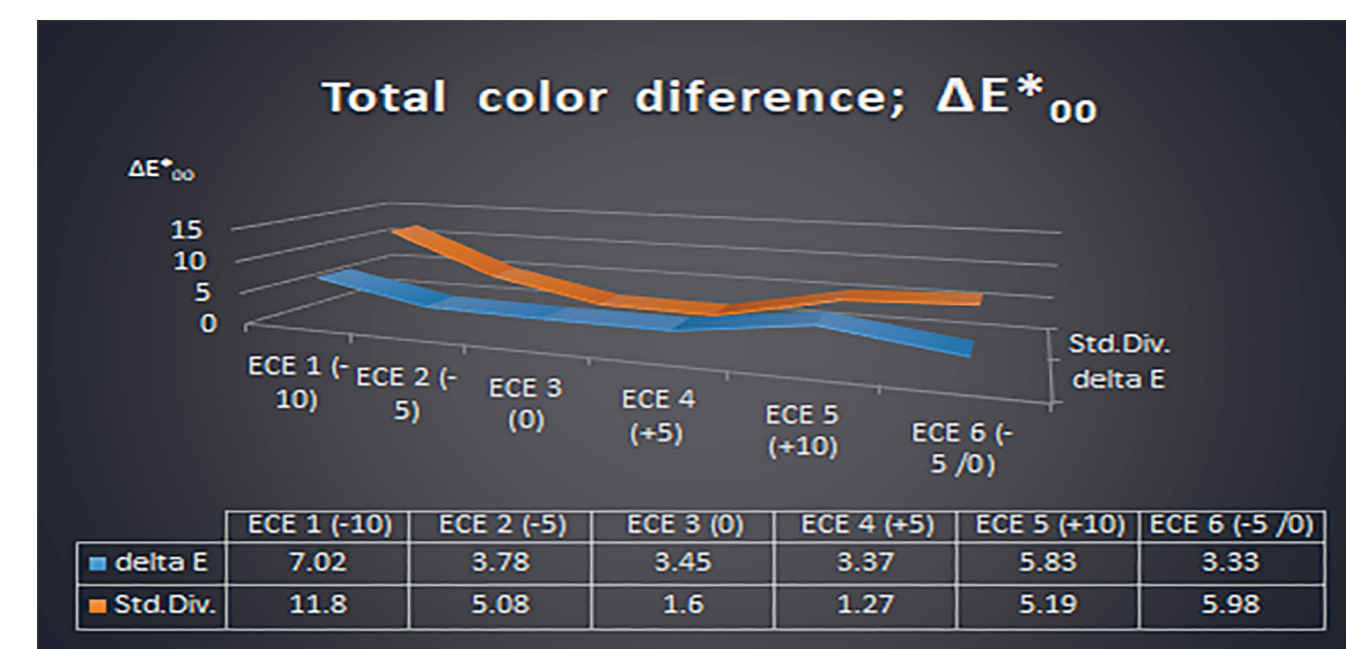


Figure 5

The total color difference between HDMCoated and ECE 1-6

Discussion / Conclusion



Dry toners consist of pigments embedded inside polymer beads. The fusing phase of the electrophotography process melts the polymer beads to the surface of the paper (Ordant, 2019). Toner is transmitted from an image transferred belt onto coated paper that was employed with a direct-current electric field when electrophotography printing is functionalized (DC).

In order toner from the belt onto the paper, new digital printing technology used an alternating-current electric field (AC). The samples (ECE 6) showed a slight reduction of ΔE^*_{00} is 0.12 (after Cyan and Yellow was adjusted).

For all ink combinations, the electric charge energy had an impact on how accurately the colors in the test chart and its overprint were reproduced. The Heidelberg Versafire EV prints at ECE 6 are better for color reproduction. Future study should functionalize each substrate unique characteristics, and it is anticipated that doing so will bring color value closer the output target and apply so boost the reaction of the other substrate.

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